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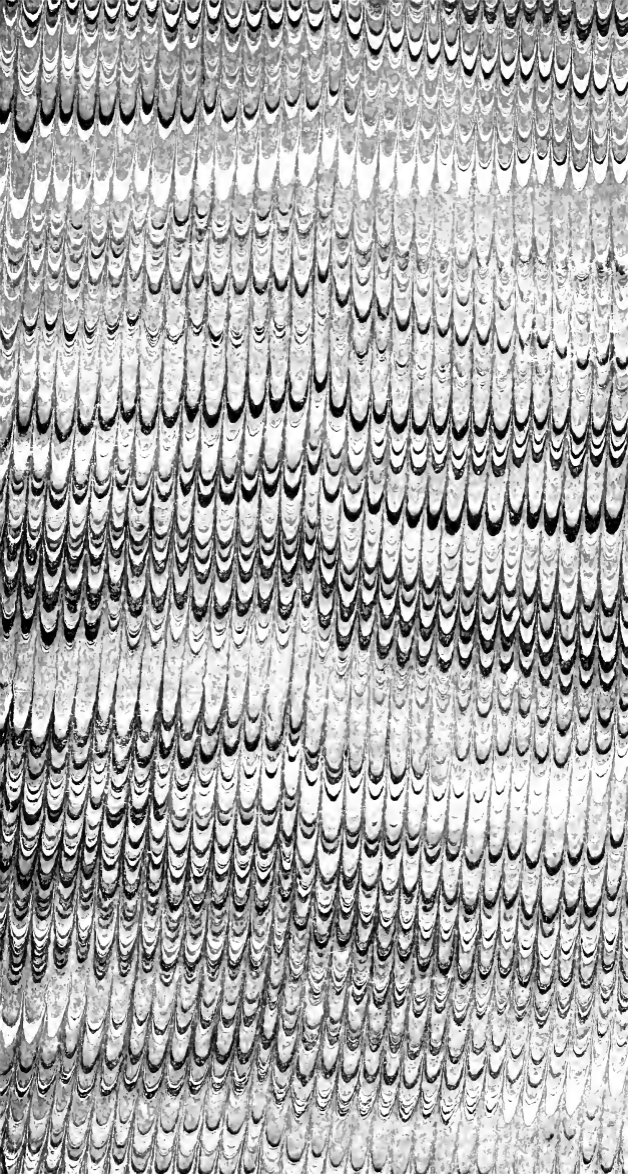
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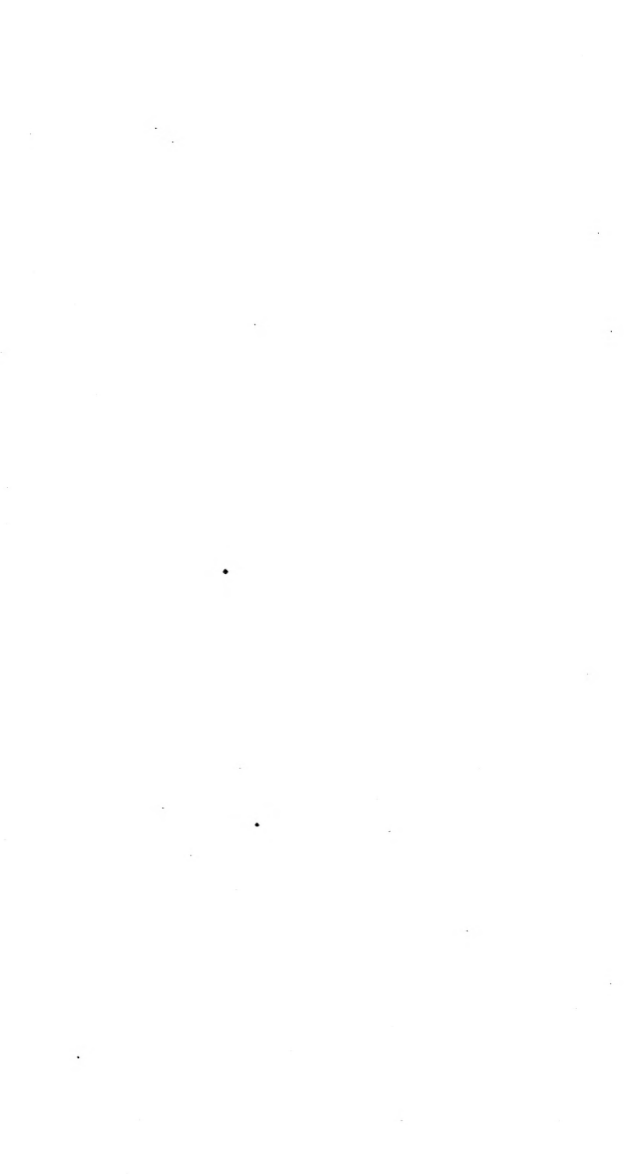
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THE  
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**FLORISTS' DIRECTORY:**

BEING A FAMILIAR TREATISE ON

FLORICULTURE,

PARTICULARLY

*The Management of the best Stage, Bed, and Border*

**FLOWERS**

USUALLY CULTIVATED IN BRITAIN.

TO WHICH ARE ADDED

DIRECTIONS FOR THE MANAGEMENT OF

*The Green-house, Hot-house, and Conserbatory:*

WITH THE

DIFFERENT MODES OF RAISING AND PROPAGATING

*Exotic Plants.*

INTERSPERSED WITH MANY NEW PHYSIOLOGICAL OBSERVATIONS  
AND VARIOUS USEFUL LISTS.

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*SECOND EDITION.*

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BY JAMES MAIN, A.L.S.

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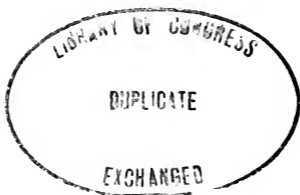
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## P R E F A C E.

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FLORICULTURE has become the study and amusement of all ranks. Is it because it embellishes the dwellings of the rich and great, or forms the gayest ornament of the villa? Or is it because it receives the regard, and employs the pencils, of the most refined and fairest of Nature's works? Yes; for all these; but, most of all, because it decorates, while it endears, the poor man's cottage.

To the superior classes of society, who have "all appliances and means to boot," the knowledge and possession of flowers form but a small part of their enjoyments; but the humble and homely man, who, when relieved from the emaciating toil and noxious air of a factory, betakes himself to the refreshing exercise of raising his favourite flowers, feels new life; his attention is

drawn to objects which are beautiful in themselves, and to results the most innocent and rational. Turbulent emotions can hardly disturb the mind which is intent on rearing tender seedlings; the very expectations of success alleviate, if they cannot remove, the cares and crosses of life; and while such employment, as amusement only, refines the mind, it adds not a little to the real enjoyment of rational existence.

The knowledge of this fascinating art is mostly confined to professional men, or lies hidden in a thousand volumes, beyond the reach of the humble though ardent florist. He, and he only, needs the assistance which is practically offered in the following pages; which, though written chiefly for those who are neither professional nor opulent, it is hoped will be not unworthy of a perusal by all who are interested in the subject.

As to the ability of the writer for such a task, he may be permitted to say, that the experience of fifty years, directly and indirectly, in the cultivation of flowers, is at least something in his favour.

But, independently of this, it is impossible that he should have been contemporary with a Maddock, a Hogg, a Sweet, and many other eminent modern florists, without knowing somewhat of the art. Where his own knowledge or practice may be defective or confined, his judgment at least will enable him to recommend with safety and direct with propriety.

How this will be done remains to be seen. His intention is to condense the whole system of professional floriculture into a concise compendium, which will embrace every thing essential to the subject: and, as it will also contain directions for the propagation of all sorts of tender exotic flowering plants, it will be particularly serviceable to those who have rare and valuable collections.

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## INTRODUCTION.

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BEFORE entering upon the methods of culture and management necessary for the different bed, border, and stage flowers intended to be briefly set forth in the pages of this work, it may be proper, perhaps, to advert to some circumstances which belong either to the knowledge of the plants themselves, or to particulars relative to their general treatment. By so doing, repetitions will be avoided, and the directions will be less encumbered by collateral observations.

As the principal part of our bed flowers are bulbs, it may not be irrelevant to describe the constituent parts of these curious vegetable bodies. Every florist should be acquainted with the physiology of the plants he cultivates; for though not so absolutely necessary, perhaps to successful management, it may nevertheless

be useful in enabling the practitioner to account for many circumstances which will occur in the course of his practice.

Botanists have classed bulbs into the different distinctions of scaly, coated, solid, and caulinar.

A scaly bulb is such as the common white lily. It consists of a vital membrane, called the radical plate or basis. This member appears to consist of an indefinite series of dividual germs, which are annually brought forth in succession. The first, or highest in order, is, in the autumn before it is developed, composed of a surrounding envelope of thick fleshy bodies, like scales. These scales are abbreviated leaves; the outer ones are — stationary, doing the office of hybernacla; while the inner are attached to the flower-stem, rise therewith, and are expanded into full form during the spring and summer. From the lower part of the radical plate, and particularly from its edges, the roots are produced; which descend into the earth in search of the nutriment required for the expansion of the plant, and which mostly die off during the repose of the bulb.

While these processes of the senior part of the radical plate are developed in the air, and the radicles or fibres in the earth, the next vital principle of the incipient series becomes every day larger in size, swelling and protruding into form its imbricated envelopement of scales, resembling a short cone, its apex containing the embryo fructification of the following year. Besides the second of this aggregation of principles, the third, fourth, or even more (according to the vigour of the plant) of the series, are sometimes produced, and which take the name of offsets, which may be separated without injury to the plant. This vital organ always appears as belonging to the largest individual of the train, continuing to produce and throw off progeny *ad infinitum*.

This curious organisation of the bulb is, when duly considered, truly astonishing! that a vegetable body, no bigger than a grain of mustard, should contain a train of distinct germs without number, and, in favourable circumstances, without end; and which are always in a gradual train of progress; the first fully developed to

perfection, and perishing this year, to be succeeded in following years by the junior successors in endless train !

A coated or tunicated bulb is exemplified in the hyacinth. This is a distinction without a difference ; it being only a peculiar modification of the foregoing. The bulb being formed by the gouty bases of some of the last and this year's leaves, embracing those, together with the stem and flower, which are to be expanded in the next.

These bulbs have also a radical base or plate, which produces the proper roots belonging to the senior portion of the plant then in the course of developement ; but which are deciduous soon after the decay of the stem and leaves. Thus shewing, that each division of the bulb is furnished with its own radical base, roots, leaves, stem, flower, and fruit.

In the case of these or similar bulbs, if in any year they are permitted to perfect their seeds, the viviparous powers of the system are less active ; their formation, satisfying as it were the impulse

of reproduction possessed by that generative organ. . On the contrary, when no seeds (which are the oviparous produce) are perfected, the effort at reproduction by offsets is increased. This observation should be always kept in mind by the florist, in order that he may have recourse to it when necessary for the purpose of increasing either seeds or offsets, as he may wish.

Solid bulbs have been described by botanical physiologists, and the tulip is given as an instance (*Principia Botanica*). But this is a mistake ; the bulb being evidently composed of abbreviated leaves, enclosed within a thin integument or covering, similar to the hyacinth, only fewer in number. These leaves are mostly elongated, and accompany the rising stem to which they peculiarly belong ; in which effort they become exhausted, and die along with the stem, or when the seeds are ripe. During the growth of the parts just mentioned, as well as of the roots which supported them, the next year's bulb is formed to carry on the succession. It has been advanced by some writers, that the

principal use of the expanded leaves is to elaborate nutritious materials for the formation of the succeeding next year's bulb ; or, that the substance of the old is somehow transferred into the new one. This idea is at least questionable ; because the bulb of the tulip lying in a drawer, where no developement or expansion of leaves can take place, will, notwithstanding, put forth its new offset bulbs, with no other assistance than what its feeble fibres, produced at the same time, can collect in this unnatural situation ; and if it be intended to produce a numerous progeny of offsets, half the old bulb (the upper half) is cut off before it is planted, to produce this effect. Young tubers, as the potatoe, are produced without the assistance of leaves. True it is, that when a part, or the whole organisation of a plant is in motion, there is a reciprocity of assistance from any one to all the others ; but this does not appear to be the peculiar office of the leaves more than it is that of the roots, if indeed so much. Checking the oviparous principle will stimulate the viviparous, or *vice versa*. But, except re-

ducing the number of parts or ramifications of a plant for the benefit of the remainder, no kind of mutilation can be serviceable.

Bringing to perfection the roots, stem, leaves, flowers, and the new bulb or bulbs, is the effort of the radical plate every year; it being the radius from which they all diverge. There they previously exist, and, after complete development, all but their seeds, or succession-bulbs, vanish away.

Caulinar bulbs are so called, because, instead of being upon or under the surface of the ground, they are produced in the air and seated on different parts of plants producing them. They are frequently seen on the flower-stems of the genus *Lilium*, protruding from the axils of the leaves from which they are deciduous. They partake of the conformation of both seeds and bulbs, possess their essentials, and become perfect plants. Bulbs are said to be buds under ground; so buds may be called bulbs out of the ground. There cannot be a more natural definition; both may be transferred from one station to another

uninjured, and both contain the pre-requisites of perfect plants. The stem-bulbs of the lilly, as they take the usual place of buds, may very naturally be considered as such.

Bulbs and buds may therefore be considered as synonymous. The first only requires to be placed in the soil to produce a perfect plant; the second to be inserted into the bark of another tree by the skill of the inoculator, whence it is developed in perfect form.

Other instances of aerial bulbs appear on the tree onion, and on several others of the same tribe. These, however, are no other than the seeds commencing growth before they are separated from the seed-vessel. Though this viviparous property is constantly seen among the onion tribe, and particularly in moist seasons, it is also casually observed in other kinds of plants; even common wheat will sometimes sprout before it is perfectly ripe.

But the most remarkable instance of the formation of bulbs is that mentioned in the Transactions of the Horticultural Society, stating,

that from a broken leaf of the *Lachenalea discolor*, perfect bulbs were formed from the oozing sap ! There are other instances of this generative power of plants, as exemplified in the *Hæmanthus*, the *malaxis*, and *ornithogalum*. Buds are always seated on or proceed from the woody or vascular tissue of the plant ; and those above-mentioned, though not woody, contain vascular membrane in their leaves, partaking of the nature of stems ; these, therefore, when under favourable circumstances, or thrown out of their regular course of developement by accident, exhibit those uncommon modes of reproduction.

The other descriptions of flower-roots are the tuberous and fibrous. Tubers, according to their form and divisions, are characterised by different appellations ; as irregular, truncated, digitated, jointed, &c.

The irregular tuber is exemplified in the anemone. It increases itself by the protrusion of blunt processes from the first seed-tubercle, each containing buds which in time come into action. The vital principle is not always seated

at the point of these divisions, but on the sides; from these the leaves and flower-stems arise in greater or lesser numbers and strength, according to the size and health of the principal tuber. The fibres for collecting food issue from various parts of the tuber, and die off annually.

The ranunculus presents what is called a digitate, or finger-formed tuber. These finger-shaped appendages are produced in succession; and seem to be depositories of the food of the plant. The crown divides itself by lateral branches from what may be called its shoulder; the young offsets being almost always somewhat higher than the parent when this happens to be placed too deep, or lower, if not deep enough. When these offsets have formed one or two fingers, they may be separated from the original, and henceforth become distinct plants.

The truncated tuber is shewn in the polyanthus and auricula. That of the former remains in a compact form, throwing out radicles below, and its leaves and flower-stems from the crown above, developing themselves in succession.

The tuber of the latter is more elongated, rising out of the ground and increasing itself by side-shoots crowned with leaves, which, being slipped off, become new plants.

The bundled or pendulous tuber is that of the *Dahlia*, &c. The lateral tubers are viviparous progeny, and are produced at the same time the principal is developed, each having one or more buds on or near the apex.

Fibrous roots, or those having neither bulb nor tuber, are well exemplified in the pink and carnation. From the under-side and edges of the crown, thread-like fibres descend and spread themselves around; they are also divided and subdivided, in their progress, into very many slender filaments. The crown of such kinds of plants is a flattened conical body, composed of many smaller ones, the bases of partly advanced or incipient shoots, each surrounded by several pairs of radical leaves, which mostly remain stationary on the body of the parent plant. The younger leaves are seated on, and rise in pairs with the flower-stems; these last being elongated

by the growth of the internodial parts. According to the strength or age of the plant, a greater or lesser number of flower-stems rise, blow, and die. The rest remain till the next or following years; and of these layers, cuttings, or pipings, are made for the purpose of propagation.

All roots, whether designated fibrous, bulbous, or tuberous, put forth thread-like fibres, which are the chief agents for collecting the nutritious qualities from the earth for the use of the plants. They are of very curious and delicate structure, impatient of dry air, or of any change of temperature or humidity. Their growth is always cotemporary with the other motions of the plant, and, indeed, the ascending and descending expansion of vegetable life seem to receive counter impulses from each other. Fibres cannot be produced, it appears, without some internal force or excitement; so neither can any material expansion take place in the air but by their assistance. The tender shoots and some of the fibres of shrubs and trees become woody in time; but, in most kinds of bed and border flowers,

the active fibres are renewed and shed annually. Some are thick and of considerable length, as narcissus and hyacinth; others are extremely attenuated.

It has been a question among florists, how far the flower and leaves of a plant are nourished by its bulb or tuber, that is, whether they yield nourishment as well as protection. The outer coverings of narcissus, hyacinths, bulbous iris, &c. appear to be only the remains of former or unexpanded leaves, which continue to act as a covering, as before observed, till the slough of the radical plate from which they sprung falls off. The interior of these bulbs is occupied by the flower, stem, and leaves, in the winter; all of which are expanded in the spring and summer. As these go forth, their former space is gradually filled by the next year's bulb. Now, all these expanding parts being previously formed, their developement cannot be said to depend entirely on themselves, but on some other part of the system which can assist their expansion, namely, the roots, which imbibe elemental food. Can

the growing parts derive any benefit from the outer covering, except protection? most probably none. With the new bulb the older one, which is in the act of expanding, has no other connexion than being seated on the same base.

From the fibrous roots chiefly, and from the qualities and influences of the air on the exposed parts, are derived all the nutriment required by the expanding parts, as well as the smaller portion required by the incipient bulb. When the stem and leaves are withered, their bases are compressed and pushed aside by the new-formed bulb, and their wasted remains are lost in the exterior envelope. The tulip is not, like the foregoing, constantly invested with the remains of former leaves; they are completely exhausted in the summer growth, and the new bulb is only left covered by a thin integument.

The changes which take place in permanent tubers, such as the anemone, are not so easily detected as those in bulbs. That they are not diminished in volume by the production of their summer growth is manifest from the circum-

stance, that they are increased in magnitude during that period. It is true, that the places of the first developed buds are the first to decay ; but then the new buds become more numerous and dispersed over the enlarged body of the tuber

Fugitive or annual tubers are such as the orchis. They are perennial by succession, not by duration, like the anemone. A single tuber, before its developement, contains two distinct principles ; the first is expanded in the air, to produce seed ; the second is formed into a new tuber in the earth, to be perfected into leaves and stem, &c. the following year. When the first has ripened its seed, the whole dies ; leaving its successor completely formed, to undergo the like changes in due time ; so that, in fact, it is only a modification of perpetual reproduction to continue existence.

But all tubers, whether permanent or fugitive, are furnished with active fibres, which mainly, if not entirely, assist in furnishing the necessary supplies for expansion of the plant, whether in the air or in the earth.

The duration of flower and other roots is commonly designated by the terms annual, biennial, and perennial.

Annuals, properly so called, are such as perpetuate themselves by seeds only ; the whole plant dying when these are perfected. Some of this description, however, may be perpetuated by art, perhaps, for ever, were it a necessary expedient ; for instance, the balsam among flowers, and the melon and cucumber among cultivated fruit. Annual bulbs are exemplified in the crocus ; and annual tubers are such as the orchis and potatoe. In these instances the identity vanishes ; that is, the tuber of this year perishes along with the leaves and stem, while a new tuber or tubers are formed. Certain parts of almost all plants are annual or temporary as to existence ; the fibres, perhaps, of all plants which are seasonal ;—bulbs and tubers as above noticed ;—the flower-stems of all perennial herbs ;—and the leaves, flowers, and fruit of shrubs and trees.

We remember no instance of biennial roots in the flower garden ; but, among culinary vege-

tables, the turnip and carrot, tubers differing only in form, are examples. If the seeds of these plants be sown when Nature intends they should, viz. when they are ripe, the plants are half formed in the autumn of the first, and perfected in the summer of the following year. It is said that the size of these bulbs or tubers are enlarged by the action of their system of foliage ; this generating and *throwing down* supplies which are destined to swell the bulbs and perfect the seeds in the ensuing season. For this purpose it is said the leaf-stalks are provided with descending sap-vessels in the first, though they must be unnecessary in the second, year of their growth. The knowledge of this remarkable change in the petiole of the leaves is a discovery of microscopic examination. To naked practical eyes this formation is never visible ; and when this doctrine is practically considered, we must conclude therefrom, that all individual plants, having the largest growth of leaves, must also have the largest roots. But the reverse of this

is the case, especially with regard to the two roots above mentioned, as well as the radish and many others. The last-named tuber, and turnip also, are either annuals or biennials according to the time of the year they are sown.

Perennial flower-roots assume very many different habits. By duration, as the anemone, which is propagated by enlargement of the tuber, in which there is an annual subdivision of the crown. The ranunculus is perennial, partly by duration and by offsets. The hyacinth, tulip, &c. are perennial, from containing in their radical plate an interminable series of individuals, which are developed in succession. Fibrous-rooted flowers are perennial by multiplication of their crowns, diverging from the first centre.

The modes of increase are also various. Distinct tubers are in some instances produced on the lower part of the stem, and just above that of the former year, as crocus, gladiolus, &c. At the lower part, as in some sorts of arum ;—from the body in irregular processes, as anemone ;—

at the shoulders, as ranunculus;—and at the edges of the radical plate, as in bulbs and many other herbaceous plants.

That the flower-stem rises from, and is closely connected with, the crown of the plate in narcissus, is manifest from the circumstance, that if the peduncle or flower-stem be forcibly pulled out of its socket before the flower expands, and immediately planted in the ground, it will not only produce fibres to enable it to perfect the bloom, but also be based by a new bulb, which will become a perfect plant.

Bulbous-rooted plants, which seldom produce offsets, may be excited so to do, as before observed, by slicing off the upper half of the bulb. This mutilation, taking away the demands of the flower and leaves, gives an energy to the viviparous principle which sends forth little bulbs from the sides of the plate, as in hyacinth, or at the margin of the outer coat, as in hæmanthus.

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## OF THE COLOUR OF FLOWERS.

Colours are said to be the gift of light, or of the form of the reflecting surfaces, or rather of the position of the atoms which compose the surfaces of bodies. The same substances reflect different rays of light according as they are changed in position, exterior form, or constitutional texture. Natural productions are variously composed, and accordingly reflect almost all the various rays which compose the stream of light. Hence the variety of the chromule, or colours of flowers, and of the different shades of colour in the same flower. And though the substance of a variegated petal appears to the eye as perfectly uniform in its texture, and though no microscopic assistance can detect the difference in the coloured matter, yet we may be certain that a difference exists, and also that it is a transferable quality. The least pressure or touch on a delicate vegetable body instantly changes, in some cases, one tint to that of another.

We are almost ignorant of the cause of these different conformations. Philosophers assert that not a particle of light can be lost, but only changed by entering into chemical combination with other bodies, and producing, by means of oxygen, a certain acidification of the colourable recipients. Florists have long wished for the power to change, as they could wish, the colours of their flowers. Some approach has been made towards the accomplishment of this desirable faculty in some few cases; and there is no doubt but that, in time, such discoveries will be made as will in some measure invest the florist with this necessary knowledge.

By art we can change the colours and forms of flowers, and give new qualities to fruit, by the well-known expedient of cross impregnation (which shall be fully described in the sequel); but in the case of full flowers, which rarely admit of such manipulation, recourse must be had to other expedients, and which, it is presumed, will sooner or later be furnished by the excellent science of chemistry.

The running of fine double flowers, that is, suddenly returning to their whole or original colour, has long been the plague and puzzle of florists. They have never been able to account for the circumstance satisfactorily. Some imagine that the change is caused by too much or too rich dress; others assert that an over-lean or sandy soil produces the same effect; and it appears clearly proved, that in very dry and warm summers such mutations of colour take place, even more extensively than in ordinary seasons.

As relating to this circumstance, may be mentioned a very general opinion amongst the cultivators of flowers, that the richer the soil the deeper will be the tints of the bloom. The colour of the *hydrangea hortensis* can be changed by the qualities of the mould in which it is placed; and the natural colour of the common primrose is very soon changed to a pink or yellowish brown by being planted in cow-dung. On this account it is, that the pure droppings of animals have always been preferred as a princi-

pal ingredient in flower composts ; because observation and experience have proved, that the tints of flowers become more vivid from the qualities contained in such substances. Chemists tell us that oxygen gas gives colour and scent to flowers and leaves, as well as to every other part of vegetables. An analysis of the compost in which they succeed best would greatly assist the florist ; indeed, it may be presumed that chemistry applied to floriculture would be productive of the best results. I know not a better opportunity afforded to a chemist, who may be fond of flowers, than the usual custom of growing bulbs in water. With them he might try many experiments, by impregnating the water with various chemical bodies, and marking the results. I have never tried such experiments myself, but recommend them to the notice of the curious.

The mutability of the colours of flowers in cultivation has been long noticed by naturalists. M. Decandolle, a French botanist of eminence, has written on this subject ; and has particularly

marked the transitions of one colour to another.

He says,—

“ The colours of flowers are variable, but only within certain limits. Lively yellow are the least variable ; dull yellow in general become white or red, but never blue ;” and adds, that it is not likely we shall ever see a blue Dahlia.

In proportion as plants are cultivated, and undergo the constant and various manipulations of the florist, so are they changed in habit and colour. Bulbs, as being of all others most easily transported, and yielding readily their fine conspicuous flowers, have always had an extra share of the care and regard of mankind. Placed in closely planted order in the garden, they imparted and received all the chances and influence of cross impregnation by accident. As favourites, they had always the best and richest composts to invigorate and encourage them, and in which various qualities existed that would change their natural hues, or add to the brilliancy of their original colours. These circumstances suffi-

ciently account for the vast variety of forms and colours among our stage, bed, and border flowers now in cultivation ; and from these consequences it may safely be predicted, that all our new or lately introduced bulbs, still bearing their natural forms and colours, may be, by artificial management, changed and broken into all the variations of colour, of which, according to M. Decandolle, they are susceptible.

In former times, when the botanical philosopher was called upon to account for the variegation of the leaves or flowers of plants, he answered that it was owing to a disease in the habit. If it be a disease, it is a mild one ; the growth or stature of the plant is not affected ; and it is not until it gets aged that the imputed malady generally disappears. Like a disease, it is transferable from one plant to another ; and must be either a malformation of the structure, or a change of the qualities of the sap. If of the former, the change of tint, which depends on form, may be rationally accounted for ; but if of the latter, it

becomes a puzzling question, as connected with other physiological facts.

In breaking flowers by impregnation the following means must be used. Any flower of a fine form and size, but destitute of high or deep colour, is fixed on to be improved ; and also the high-coloured flower whose tints are wished to be imparted. The two parents are such as it is likely will blow on the same day. If both are well watered (if needful) the day previous, it will assist the operation. Soon as the plant destined to be the female opens its blossom in the morning, let it be immediately deprived of its own stamens by a pair of fine pointed scissors.

Soon as its stigma or stigmas are fully developed, which may be known by their glistening appearance, bring the ripe stamens of the intended male parent, and therewith dust and cover the stigmas of the female, and immediately shade from direct sunshine, and shelter from wind, if either be necessary. This should be repeated several times in the course of the same

and following day. If the impregnation has taken place, the flower will soon fade ; but if not, it will remain longer in vigour ; in which case the stigmata may be again dusted with pollen to ensure success. The pod or pods so impregnated should have every care bestowed to bring the seeds to perfection, by being kept guarded from accidents and from exhaustion by other pods on the plant.

Should seeds come to perfection, be sowed, grow, and be reared to a flowering state, the major part of them will be found to have inherited *the form and size* of the mother, and blended with or wholly *of the colour* of the father plant. In most plants which have been subjected to this process, the result is very uniformly as above stated. It is a curious and interesting experiment, and particularly useful to the commercial florist. It gives scope for the most extensive improvements in floriculture : it presents a prospect of how much Nature may be varied and improved by art, and of the flower-gardens of futurity, which will be embellished by new de-

scriptions of floral beauty, never hitherto contemplated by the most enthusiastic of Flora's votaries.

All flowering plants which perfect the two most essential parts of fructification, viz. the stamens and stigma, whether single or semi-double, are capable of being fecundified in a lesser or greater degree by each other. The families of lilies, pinks, &c. &c. are particularly susceptible of such manipulation; and though the Dutch, French, and several English florists have brought cross-impregnation to great perfection, the art may be said to be still in its infancy.

The aim and objects of the florist are very different from those of the mere botanist and such as are admirers of simple unassisted Nature only. By the latter, double flowers are considered monstrous—as aberrations from the simple elegance of Nature. But as admiration is bestowed on every branch of imitative art, why should not the talent and ingenuity of the florist receive his share of commendation for the production of realities, which is so readily given to

and lavishly bestowed on pencilled representations of the same objects ? Monstrosities in animate nature can yield no pure pleasurable ideas ; they are only valued, from motives of curiosity, for their singularity as a *lusus naturæ* ; but such incidents in the flower-garden are surely admissible ; for there they are only an exuberance of elegance, in forms and colours ; in short, an excess of sweetness. Flowers, indeed, may be uninviting or uninteresting ; but they never can be positively ugly.

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## OF THE SCENT OR AROMA OF FLOWERS.

The fragrance is one of the most attractive and agreeable properties of flowers. Some plants emit an odoriferous effluvia from their leaves and stems at all times ; but it is chiefly while they are most interesting to the sight that they are also most delightful to the smell. Many flowers are scentless, and several are disagreeable ; but the

great majority of them, if not extremely fragrant, are always in some degree refreshing to the sense.

As the atmosphere conveys this quality to a considerable distance, it must be a fugitive body sufficiently material, though invisible, to be incorporated with common air in a gaseous or other highly refined state. It seems to be yielded most intensely from the centre of the flower ; hence it has been supposed to be a kind of vapour from the honey or nectar ; but it is also contained in the other parts, as detached calyces, petals, stamens, style, and pericarp, as well as the seeds, which carry with them the aroma more or less intense.

Scent may be discharged and transferred by contact, detrition, maceration, dilution, &c., and combined with other substances, in which it may be preserved ; of course, it is intimately united to the essential oils, aqueous juices, or fibrous components of the plant.

The state of the air has considerable influence in regard to the intensity of floral scent. In a fine, still, dewy morning, the air is as it were

surcharged with it ; but soon as the sun's heat increases evaporation, or should sweeping winds prevail, the scent is dispersed far and wide.

A curious circumstance, lately noticed, shows that the fragrance of flowers is capable of being exalted by qualities placed, or which happen to be, in the near neighbourhood. Onions growing near roses improve their scent. This seems to be a proof that there is an intro-susception of the extraneous quality ; and, moreover, confirms the old idea, that strong or pungent applications to the roots exalt, not only the colour, but the scent also.

It has been noticed, of the common ever-flowering Chinese rose, that, when first introduced, about 1793, it was, as the little darker-red one still is, almost scentless ; though now, 1829, with many of its varieties, highly fragrant.

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## OF SOILS

The surface of our planet is composed of various descriptions of matter, all arranged and

disposed by the action of fire and water. These deposits declare the universality, force, and direction of a general mighty current, and also the courses and effects of partial currents, generated while the waters were receding from the deluged earth. The eastern sides of all mountains, hills, or any considerable elevation of surface, are less precipitous than the western; the latter being more abrupt and washed bare by the general current, which evidently flowed from the west. Hence we find the finest of the detritus of the antediluvian surface carried to, and deposited on, the eastern slopes, especially that description of soil called loam. It also appears that, during the time when the flood was passing off, partial currents were in action, falling from the higher to the lower ground. The larger valleys were partly formed by, while they conveyed, the larger currents; receiving the inferior streams along their sides; these forming smaller valleys, ravines, and all those beautiful undulations of surface which exist at this day.

The depth and rapidity of a current gives cha-

racter to its channel. If deep and slow, whatever particles of earth it contains are deposited in the consistence of mud. If shallow and rapid, the lighter earthy matter is washed away, and the bottom is covered with stones, which become boldered by their action on each other. So the surface of the earth is now found to be sand, gravel, loam, clay, or bare rock, according to the depth or rapidity of the currents which passed, and in passing deposited them.

Although the general surface was formed by the action of the deluge, there has been formed, since, other descriptions of soil, which are particularly useful in the cultivation of flowers, and which will be noticed in their place.

*Sand.*—This is composed of stones of the smallest dimensions, equal in size and figure, semi-transparent, and light enough to be carried along by action of water, which washes it clean from other earthy matter, and deposits it in beds below the shelves of the channel. It is a residuum from lighter earths, or the detritus of rock or gravel, separated by a lively current,

and precipitated when the current is in a certain degree moderated. It is found of many different colours; contains but little vegetable food; but is an indispensable component in all composts. The pure white, or lightest coloured, usually found on commons, is the best for the florists and all horticultural purposes: the deep-brown or black, often containing ferruginous qualities, is hurtful to most plants. Sea or river sand may sometimes be used with propriety and advantage when pure pit sand cannot be had.

*Clay*—In its general character, is composed of very minute particles of earth reduced to their ultimate degree of fineness; consequently closely compacted, adhesive, impervious to air or water; hardens in the sun, and burns to a red earth. Clay is changed into loam by cultivation, and the addition of sand, lime, and other friable substances.

*Loam*.—Soils, commonly so called, are superior to all other for the purposes of the florist. It is a well-proportioned mixture of fine clay and sand, containing as much of the former as

gives mellow compactness, and no more of the latter than makes it sufficiently absorbent of water and receptive of every influence from the atmosphere. It is usually found of considerable depth, and reposing on rock, or clay, and sometimes, though more rarely, on gravel. Loam, in its natural state, is of various colours; on some elevated situations it is red; in valleys, it is almost black; but on gentle declivities, pale brown or hazel. That best suited to the culture of flowers is found in old pastures, on commons, and in natural woodlands; either composing the surface, or in pits of considerable depth. When obtained pure from such wastes it is called maiden loam, because it has not been exhausted by crops, and because it contains a certain quality which has yet no name among cultivators; a quality, which is, beyond all others, favourable to vegetation—this luxuriating when that is present, and failing when it is fled. This maiden quality exists in different degrees in all kinds of loam, and indeed in all kinds of soil when first broken up.

*Marl*—Is a species of clay or loam mixed with lime, and often very suitable for forming heavy composts.

*Bog, moss, or peat earth*—Is not a diluvial deposit, but an accumulation of decayed vegetable matter, in hollows of stagnant water. This should be very cautiously employed by the florist, and never but as a medium for other qualities, after its own hurtful principles have been dissipated.

*Moor earth*—Is that thin turf of fine sand and decayed vegetable matter found on commons or waste land where heath usually and naturally grows. This is the favourite soil of a very numerous and beautiful division of plants, and is an indispensable auxiliary of the florist. Where it cannot be conveniently obtained, it may be well imitated by mixing equal parts of fine white sand and leaf mould.

*Leaf mould*.—This is composed entirely of rotten leaves, decayed wood, twigs, bark, and other wreck of vegetation. It may be found in old saw-pits, in woods, or procured by collecting

leaves in the autumn, keeping them heaped together in a pit or shady place, and, if occasionally moistened with manured water to hasten decomposition, a most valuable material would be obtained for every purpose of the florist.

These are the various soils and substances which Nature presents to the horticulturalist, and of which, and other substances, he compounds his composts, according to their nature and capabilities of receiving assistance from art. That different plants require different descriptions of soil is an universally acknowledged fact. When a plant is first taken into cultivation, the cultivator generally takes a lesson from Nature, particularly as to the kind and qualities of the soil of the native habitat; rightly judging that his artificial compost should be similar, in order to expect and secure success in the management. And though an exact resemblance in constitution and quality would be sufficient for the mere existence and ordinary growth of the plant so translocated, yet the florist is not merely content with its existence: he will study to pamper it

into extraordinary growth—to increase the magnitude of its flowers—heighten or vary its colours—and augment the number of its offspring. For these purposes, he supplies his favourite, not only with the simple materials of its native bed, but each constituent in increased proportion.

The proper application of these succedaneums is the result of observation and experience. It is a specific portion of horticultural knowledge which has descended from former to the present race of florists ; and that it may be more widely known, and handed down to posterity, is one purpose of this little work.

The pre-requisites of flower-beds and composts, are depth, friability, and necessary richness.

The practice of trenching the sites of flower-beds to the depth of three feet is found to be of great service ; not that any of the fibrous roots can reach so low, but because the bed should be quickly drained after much rain, and that in dry weather the roots may be invited to run as deep as they have a tendency to go

There is another reason for deep trenching, which is no doubt as beneficial to flowers as it is to all other plants ; viz. they receive a greater share of that genial moist warmth which is at all times rising from the interior of the earth to its surface. This is a circumstance not enough attended to ; and by many practitioners quite unheeded : it is, nevertheless, a great assistant to vegetation. According as we descend, the temperature increases. In the winter and spring months, it is by several degrees warmer at the depth of three feet than at or near the surface. The ground being opened to that depth, therefore, permits the ascent of this warm steam in cold weather, and allows it to rise like a refreshing vapour when the weather is hot and dry ; in both seasons of much advantage to the roots.

*Friability.*—That flowers may have every encouragement from the constitutional texture of the compost they are placed on, it is prepared by being compounded, aerated, and screened, till it is free from stones, clods, &c. and all of a uniform

consistence. It should not be liable to knead in working, nor run together under heavy rain. By the addition of sand, rotten dung, or leaf mould, it must be sufficiently porous to receive, and as readily discharge, any excess of water, as well as allow the penetration of every quality from the air, which is beneficial to plants.

*Enriching.*—The high fertility of the soil intended for flowers is one of the principal provisions to be made for their prosperity. In the compost every ingredient should be present that experience has discovered to be useful, and every quality added which successful practice sanctions, or even what rational ingenuity may suggest. The luxuriance of the plants depends on the suitableness and temperament of the compost; and the richness of the tints depends on the qualities contained in it.

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## OF COVERINGS, STAGES, &c.

For the defence of fine bed-flowers from inclement weather, and to preserve them in beauty

as long as possible, the florist who wishes to excel in the art, and derive the utmost satisfaction from the pursuit, should provide himself with every necessary appendage for the purpose. The means of temporary protection against rain, hail, or snow, and awnings for the preservation of the full-blown flowers, are both necessary.

Stages, as well as beds, require these apper-tinents. Few lovers of flowers, who take delight in their cultivation, can grudge the expense of proper means for both shade and shelter. Commercial florists have arrangements for these purposes on an extensive scale, embracing all the advantages of convenience and utility: the amateur, or flower-fancier, adopts as much of these contrivances as is sufficient for his more limited designs.

For all bed-flowers, particularly hyacinths and tulips, the beds should be surrounded by boarding from twelve to thirty-six inches high, to give, for ease of examination, the necessary elevation to the flowers. Staples driven in at the corners and along the sides of this boarding

serve to admit wooden or iron hoops, which, connected along the centre and at the eaves with slight laths, form a sufficiently firm and effective frame to bear any covering of mats or canvass.

Carnation stages are either single or double ; that is, having one or both sides composed of graduated shelves. In the one case, a walk in front is sufficient ; in the other, the walk is carried all round. Those for auriculas are similar ; both being raised on feet, each of which stands in pans of water, to prevent the visits of creeping insects, which very frequently molest the florist.

When the foliage of the plants has advanced so far as to be in jeopardy from frost, &c. the hoops are placed, and the coverings got ready to be employed as the weather directs. Tulips are, much more than others, liable to be injured, especially during the months of February, March, and April. They are then most easily damaged by hail, or by water resting near and afterwards frozen round the flower-bud ; and, though every care should be bestowed to protect the plants

from such casualties, yet they must not be deprived of the full air too long at a time, as this would injure by enfeebling them. So much is over-covering to be guarded against, that some most intelligent cultivators use only small-meshed nets as a defence, which they maintain is sufficient against every change of weather.

When the flowers begin to show colour, preparations must be made to erect the awning. This is intended to shade them from the sun, and shelter them from high winds. The frame should be as light in its construction as is consistent with its stability against blowing weather. It is either a permanent erection of slender columns, eaves-plate, rafters, and ridge-board, or a temporary framing of similar scantlings, screw-bolted together for the purpose. The former are preferred by the commercial florist; the latter by private growers.

No directions need be given for a permanent structure that any common carpenter can supply and execute. But for those who only need a temporary thing of the kind, the following

description of a very suitable and convenient one may be useful.

The bed is surrounded by a fine gravel or sand walk, two and a half feet wide: on the outside of the walk, oaken trunks, sixteen inches long, having central openings two inches square, are sunk and firmly rammed in the ground, their tops level therewith. These trunks have each a capped stopper, to be put in when the frame is taken away; they remaining always in their places, and serve as sockets to receive light columns six feet high, turned out of three-inch-square stuff, having a two-inch-square tenon to fit into the trunk, and also a smaller tenon at top, to pass through the eaves-plate, and also receive the foot of the rafter which rests upon it. The rafters meet on a ridge-board to which they are fastened by a screw-bolt and nut. Besides the corner columns, intermediate ones are added according as the length of the bed requires.

The canvass for the roof is in one piece, fixed by its middle to the ridge-board; the two sides being moveable on rollers or otherwise, and rolled

up or let down at pleasure. The ends and sides are closed by curtains, and hung on headed studs driven into the end rafters and eaves-plate, by eyelet-holes worked in the upper leech of the curtains; at the bottom, they are fastened down by tenter-hooks or ties. Such a frame and awning, if care be taken to lay it up dry in a spare room, will last for many years; and, when in use, may be made, by ornaments fixed at the ends of the ridge and at the tops of the columns, not at all an unsightly object, even in the flower-garden.

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## OF INSECTS, &c. DESTRUCTIVE TO FLOWERS.

The florist has continually to guard against the depredations of enemies that feast on and disfigure his choice flowers. Snails (*Helix*) and slugs (*Limax agrestis*) are the most common and destructive to both flowers and foliage. They are easiest got rid of by watering the ground or places where they harbour with lime or salted

water; care being taken that the last be not too strong, nor reach the roots of the plants in any great quantity. Another most effectual remedy is dusting the plants and ground among them with hot lime. The most convenient way of doing this is by putting recently slacked lime into a small bag, about eighteen inches long, made of thin canvass, and filled about half full. This, held by the mouth in one hand, and quickly jerked towards the plants, a cloud of the finest of the lime will be forced through the bag, and, reaching every cranny, will fall lightly and equally on every surface. This will drive every slug, snail, and earth-worm from the place, or make them retire as low as they can into the earth, where they will remain motionless for several days; nor will they again venture out while the lime retains any portion of its causticity. This dressing repeated occasionally, and especially after rain, will keep all such depredators at a proper distance. Dry oat or wheat chaff laid round favourite plants is also a great baulk to the snails or slugs in their motions.

Two species of wire-worms, as they are called, prey on the roots of flowers. One appears to be a minute species of *Scolopendra* ; the other is the larva of the springing beetle (*Elater castaneus* ?); and a third I have lately noticed, as destructive to tulips, is a *Styphalinus*. I am not acquainted with any application which is either fatal or noxious to those hardy worms. Lime or salted water is the only thing I would suggest to offend them : only, if applied sufficiently powerful for this purpose, it risks the well-being of the plants. But, as the former of these insects are mostly seen in half-decayed nodules of vegetable or animal matter, and the latter often in the fresh loam, complete aeration of, and rejecting recent animal substances from the compost, are the only precautions to be taken to banish these plagues, as well as many other species of ground insects.

Woodlice (*Oniscus armadillo*) burrow about the roots of flowers, and appear to gnaw the epidermis of plants. An old shoe, filled with hay sprinkled with sugared water, forms a good trap for them. This also acts well as a lure for ear-

wigs\* (*Forficula auricularia*), which are very destructive to the blossoms of stage-flowers. Both these are, in some measure, guarded against by setting the stage feet in pans of water; but, as earwigs fly when young, they can easily alight on the plants. Yet it is only when they are old that they are so voracious; and then, as they never fly, the pans of water so placed may be useful.

The green-fly (*Aphides*) frequently seat themselves on flowers, particularly the carnation. They are easily dislodged: but the means are not a pleasant application for objects whose high recommendation is their scent. An infusion, the

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\* Earwigs can only be got rid of by capture. Bean-stalks or reeds are too fragile and perishable for the purpose. I recommend, for the preservation of wall-fruit (and flowers also), a trap made of twenty tin tubes, one quarter of an inch diameter, each having a stop or division in the middle, and eight inches in length, all soldered together in a plane, side to side. This, first dipped in honeyed or sugared water, and placed close to the wall, behind a branch, will at once attract the insects to feed, and induce them to remain in the tubes; out of which they may be shaken into a pail of hot water, as often as necessary. Such traps will cost about four shillings each, or according to size.

powder, or smoke, of tobacco, are all fatal to these honey-dew-making insects. In this case, the florist's duty is the same as the fruit-grower's: they both should endeavour to prevent the attack rather than wait to perform a cure. If the insects appear before the flowers, tobacco may be used without fear of injuring their sweetness: and, whether they have showed themselves or not, a good fumigation about a week before they blow will probably keep the insects off during the bloom. Anticipating thus the attack of the fly is an excellent expedient in the culture of fruit, as well as of flowers; and, were it a rule in practice, constantly and timely observed, many beautiful flowers and much fine fruit would come to perfection which are every year spoiled and lost. The fumigation should be done with bellows designed for the purpose; and if the plants be first sprinkled with water, the smoke will adhere more readily.

Grubs of different kinds, the larva of moths and beetles, are sometimes found to prey on bulbs; but there is no remedy or defence better

than frequently turning and exposing the compost before it is used, and now and then adding a sprinkling of hot lime, which will prevent its being chosen either as a retreat or nestling-place by the insects.

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### DISEASES OF FLOWER PLANTS.

There is no disease peculiar to bed-flowers which is not common to almost all other vegetables. Bulbs, particularly of tulips, are subject to a kind of canker, which is not easily accounted for. It appears in putrefying specks on the outsides of the bulbs and leaves, and is soon covered with a blue mucor, and probably is the seizure of a fungus. It is soon fatal if it extend to the radical plate after the bulb is in the ground; dying off as onions are often seen to do. When observed on the bulb, the speck should be cut out, and the wound exposed to the sun to heal it. It should also be cut from the leaves to prevent its spreading.

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# CULTIVATION.

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## TULIPA GESNERIANA.

### GARDEN TULIP.

CLASS, HEXANDRIA.

ORDER, MONOGYNIA.

NATURAL ORDER, LILLIÆ.

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THE tulip has long been a cultivated favourite. The simple elegance of its form, and the splendour and variety of its colours, have deservedly ranked it as “the queen of the flower-garden.” Being one of the harbingers of summer, there are many pleasing ideas associated with its appearance. As a child of returning spring, and when all Nature revives, it is connected with the hopes of man. Hence the tulip has always had a distinguished place as a domestic ornament;

and no vegetable ornament repays the care of its protector with more various beauty than this.

To increase the magnitude and improve the form, to add to the number and brilliancy of the tints, the florist has recourse to various expedients to produce the desired results. He propagates by seeds and offsets; and, when these have arrived at a proper age or size, treats them in the way now to be briefly detailed.

In propagating by seed, the rule is to procure the best-ripened seed from what are called, amongst florists, “breeders;” that is, strong-growing, robust plants, with well-formed cups, having clear bottoms, either white or yellow. The sorts from which valuable seedlings have been obtained are, according to the ingenious Mr. Hogg, Louis, Charbonniere, Davey’s Trafalgar, and some others in high repute in the profession.

The seed should be sowed in the latter end of January, or the beginning of February, in twenty-four-sized pots. The pots should be well drained by lime-core or rubbish, to keep away earth-

worms, which are hurtful to the plants. The soil should be good, and carefully freed from wire-worms, grubs, or other insects that may accidentally harbour in it. Cover the seeds about half an inch with sifted mould, and keep the whole body of earth in the pot rather moist than otherwise. The seed-pots must have the protection of a frame and glazed sash, and be defended from severe frost. When the seedlings are up, they should be gradually inured to the open air and mild sunshine mornings and evenings. Watering must be moderately continued while the leaves continue to grow, or remain green; and, when dead and withered, the pots must be kept dry for a short time before the little bulbs are taken up, to be dried and stored in the usual manner.

This is the common practice. But Mr. Sweet advises another plan, which will very much expedite the period of their flowering. He sows immediately as the seeds are ripe: and giving the seed-pots or pans a winter protection in a frame, the seedlings come up in the spring.

As soon as they are fit to handle, they are pricked out on a bed of sandy soil. When the leaves die, the bulbs are taken up, and immediately planted in a fresh bed (no time being lost by storing); and thus, by keeping them constantly in motion, Mr. Sweet has no doubt but that they may be brought to shew flower the third year.

A bed of suitable soil should be prepared for the seedling bulbs, in the open ground, before the middle of October, the usual time for re-planting. In this they should be neatly drilled, or dibbed in, about two inches deep; and, during their progress in the following spring and summer, be carefully guarded from insects, slugs, &c., and receive every encouragement from cleanliness, occasional watering, and the like.

Such attention and treatment are necessary every following year, in order to accelerate the period of their flowering. The florist must remember, that the first flower is actually formed in the seed, enveloped in a certain number of leaves; which leaves must be all developed before the flower can possibly come forth; so

that the stronger the seedling grows, or rather, the more leaves it has power to put forth in any one year or years, the sooner will it present its flower. All this time the anxious florist must wait, and remain in ignorance whether, as Mr. Hogg observes, he has got a prize, or only a progeny of blanks!

It may be just remarked here, in respect of seeds, that the choicest coloured flowers are bad breeders, and that when they do yield seeds, give offspring of less value in every respect than such as are nearer to their natural state. This circumstance seems to indicate, that the further they are from their natural character, the less powerful are they to perpetuate their respective semblances. This, however, is not a singular characteristic of the tulip; but is observable in many other instances amongst cultivated plants.

The propagation of tulips from seed is an attempt that nothing but the ardent enthusiasm of a thorough-bred florist could undertake. The suspense of four or five years would be intolera-

ble to an ordinary mind, where there are so few chances of success. But the thing is done, and constantly, by commercial florists, to whom a new beauty is of considerable importance.

Propagating by offsets is the usual and most certain method of increasing the stock, and perpetuating the favourite varieties of the tulip. As has already been noticed in the introduction, they, when in vigorous, or even ordinary, health, produce, besides the principal successor-bulb, one, two, or more junior bulbs, which, in the management of the principal, it is necessary to displace. Such viviparous progeny are planted in nursery-beds by themselves, and are reared and forwarded to a flowering state in the same way as directed for seedlings. They come into flower, sooner or later, according to their size or age; they then become principals, and are ranked and cultivated therewith. It has also been before noticed, that if the principal be deprived of its flower-stem early in the season, the offset progeny will be increased; and this kind of mutilation is carried so far by the Dutch florists, as before observed,

that, when they wish a new variety to be extraordinarily prolific in offsets, they cut off the upper half or apex of the bulb, to produce this effect.

But the management of perfect bulbs is the principal business in floriculture, and now falls to be noticed:—and, first, of the compost. This should consist of,—

Three barrowfuls of rich mellow loam ;

One barrowful of fine leaf-mould ;

One barrowful of old and perfectly rotten dung ; and

Half a barrowful of sea, river, or white pit sand.

This compost should be collected and thoroughly incorporated several months before it is wanted ; turned from time to time, kept in a shady place, and from too much rain. It contains the most suitable substances for the incitement and support of the plant : the loam and dung yield the nutriment ; the leaf-mould and sand give that porosity and openness which all bulbs more or less require.

Some florists imagine that the soil, which, in

its constitutional temperament, is suitable for the bulb, may not be rich enough for the radicles which supply the flower and leaves; and therefore advise one kind of compost for the surface, and another and richer for the bottom. Maddock, for instance, directs that the natural soil of the bed be taken out to the depth of twenty inches, and filled with sound fresh loam to the height of ten inches; upon this is laid a stratum of two years' old rotten cow-dung and loam mixed together, twelve inches thick; and above all another layer of loam, three inches thick, to form the surface. There is reason in thus composing the bed; because, as any kind of animal manure is foreign to the plant, it should only be offered to them; that is, put within their reach, and if suitable, they will find and partake of it; and if not, there will be no risk of injury from it being forced upon, or placed in contact with, the bulbs, which, from its property of retaining water, and inviting insects, might be, perhaps, detrimental to them. And even if placed at a greater depth than their roots can ever be ex-

pected to reach, yet the gaseous qualities of the dung, ranging far round its actual place, may reach and assist the plants.

The Lord Mayor's day, 9th November, has been long on fixed by London florists as the proper time for planting the tulip. In doing this no other attention is required than placing the bulbs regularly about six or seven inches apart, and about three and a half inches deep. Placing each bulb in a cone of sand is a usual practice; it may do good by keeping off damp and insects from the bulb while it is inert; and it can do no harm by impoverishing the soil of the bed. In order that the business of regulating and planting the bed may be done with accuracy and despatch, I shall endeavour to describe Mr. Groom's, of Walworth, (one of our most eminent florists) excellent method of doing it; and though it be not necessary every where, it deserves imitation wherever it may be applied.

Mr. Groom's principal tulip-bed is four feet wide within, and one hundred and twenty or more feet in length. It is raised fifteen inches above

the surface of the surrounding walks, by neat boarding. For the purpose of levelling the surface for planting, marking the places of the bulbs, and regulating the surface afterwards, he has invented a gauge called a strike. This strike is made of a thin light board, one foot longer than the width of the bed, and about seven inches broad. Its under edge, which is used for levelling the bed to receive the roots, and marking their places, has notches, three and a half inches deep, near each end, which fit on the upper edge of the side boards; and, on being moved backwards or forwards by a man at each end, lays the surface in the desired form; the lower edge being curved for the purpose, so as to leave the surface of the mould about two inches higher in the middle than at the sides. Thus levelled, the bed is ready to receive the bulbs; their places are marked by means of the strike. Seven rows are planted lengthways of the bed, at the distance of seven inches between; leaving three inches at each side betwixt the outside rows and the boards. The places of the rows are marked

on the strike, and at these points small staples, one above the other, are fixed on the face of the strike; these receive seven small pegs, or dibbers, which, when the strike is put down at each mark regulating the distances between the cross rows (the same as that between the long rows), marks the exact places of the bulbs.

The roots, being placed, are now covered up with the proper compost, which is usually of a lighter description than that in the bottom, and the surface is smoothed off by the strike reversed; the upper edge of which, for this operation, is also cut with a curve, having shoulders at each end taking in the whole width of the bed and sideboards; upon and against which the shoulders slide, while the strike is moved onward to take off the redundant covering, leaving the surface about three inches higher along the middle than at the sides.

From this description, an idea may be had of how easily and expeditiously the planting is done.

Such a mechanical method of planting and arranging a flower-bed is certainly preferable to

mere random proceeding ; it should certainly be adopted where there is much to do ; though any thing on a small scale may be done accurately enough without either boarding or strike.

In preparing the bulbs for planting, it is recommended by some writers to divest them not only of their offsets, but also of the brown integument with which they are covered. I never heard, nor am I aware of any good reason for this ; and therefore think it a refinement amongst florists which may just as well be omitted. If the bulbs be sound, and free from any loose remains of the last year's bulb, it is enough\*.

In general, it is the practice to have either seven, five, or only three rows on a tulip-bed. The largest bulbs, or rather the tallest growers, are placed in the middle row ; the intermediate next ; and the dwarf, or lowest growers, at the sides of the bed.

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\* There is one reason given for divesting the bulb of the brown covering, viz. that it sometimes prevents the protrusion of the side roots.

The bed should be placed in an open part of the garden, usually in front of the conservatory or greenhouse, which is its proper place. There it will have full air, and all the natural shelter it requires.

As soon as the planting is finished, or soon as the points of the leaves appear above ground, the hoops should be fixed and the covering ready to be used against hail-storms, snow, or long-continued rain. This care and attention must be continued till all danger from wintry weather is over.

The bed should be allowed to have a thorough soaking in the spring. Tulips are never supposed to stand in need of hand-watering; and, therefore, a provision should be made, in forming the bed, to meet any lack of moisture caused by a dry spring, or first months of summer. Deep trenching the bottom of the bed, and putting in a good layer of rotten dung at a proper depth, are both judicious practices for retaining moisture in the bed; because a body of dung holds moisture much longer than any of the other in-

redients of a flower-compost. It becomes a reservoir of humidity, from which exhalation is ever rising, most refreshing to fibrils that descend in quest of it.

Having defended the plants from the rigours of the winter and early spring months, the next thing is preparing to give them the necessary protection while they are advancing to, and continue in, bloom. The expedients for doing this have already been adverted to: and, now the collection being in full perfection, the different distinctions of the varieties composing it are to be noticed.

Tulips are regarded in two grand divisions, viz. early and late blowers. The former, though they are the first to regale the eye, are the least esteemed by the florist; because they are more diminutive, more fugitive, and less richly varied in colour. It is the latter description on which so much care and admiration are bestowed, and to which our observations specially refer. It is divided into grades by the florist, and distinguished by the names following, viz.—1. *Byb-*

*loemens.* 2. *Primo baguets.* 3. *Baguet rigauts.* 4. *Incomparable verports.* These have white bottoms or grounds. 5. *Roses.* And 6. *Bizards.* Which last variety have yellow bottoms, or grounds; i. e. the general colour of the petals is yellow, with markings or streaks of other tints. The roses have white grounds, with rose-coloured margins, spots, and streaks.

There are, besides, in the extensive family of the tulip, peculiar varieties of all the above; which are valued for singularity of form or colour. Such are those called parrots, from the odd mixture of tints and irregular form and position of their petals. Double-flowered, sweet-scented, &c., all which varieties, though not admitted to the distinguished honour of a place in the principal tulip-bed, are, notwithstanding, highly ornamental gems of the border.

To preserve neatness and order among the flowers, it is necessary they be tied up, to prevent them falling from their place. Small green lines are extended from end to end of the bed, ranging with the rows; these stretched tightly

and supported by intermediate slender props, if necessary, serve to tie the stems to, with green-coloured-worsted.

When the beauty of the flowers is over, and the greater number have lost their petals, the awning and frame, if it be a moveable one, should be taken away, the stoppers put on the trunks, and the hoops again fixed in their places to allow of occasional covering against excessive rain. All the seed-vessels should be cut off as soon as the petals drop; because, as seeds are not wanted from the fine flowers, and as this part of the plant exacts a considerable portion of the vigour of the system, it is only a waste of it, if expended on an unnecessary production. It is perfectly consistent with physiological facts, that this dismemberment should have the effect alleged. It has been already shewn, that there is an intimate connection between the oviparous and viviparous organization of bulbous-rooted plants—a reciprocity of action, balancing the crescive powers of either. From the moment the seed-vessel is broken off, the viviparous prin-

ciple receives a new impulse ; and that impulse is to enlarge the next bulb in succession, as well as the other offset-bulbs that may have been previously formed. The peduncle or stalk, now no longer useful, begins, like the leaves, to lose its vitality ; and, shrinking, changes colour, and gradually withers away.

There is a critical point, during this decay of the leaves and stem, which experience has proved should be particularly observed by the tulip grower ; viz.—when the stem in withering becomes of a purple colour, it is a sign that its connection with the radical plate and fibres (for with the new bulb it has none whatever) is cut off, and that the new bulb is an independent being, having “ thrown off its mortal coil,” and therefore may be taken out of the ground with safety. If taken up before this connection is dissevered by Nature, the new bulb “ will be weak and spongy ;” and if taken up later it, by being kept in the ground, continues in a state of excitement and premature growth, which is

injurious to the purity and distinctness of its colours in the succeeding year.

This sign on the stalk and leaves usually appears in about three or four weeks after the time of full bloom ; during which time the bed only requires to be kept rather dry than otherwise.

When a tulip-bed is regarded as one of the principal ornaments of a garden, it is an exhibition of which every friend or stranger has a view ; and, on the premises of a professional florist, his tulip-bed is a show to which every customer is invited. In such cases, next to the excellence and condition of the flowers is the precise order of their arrangement. Every individual having its right place, according to its height, colour, &c., and, above all, that there be no unsightly blanks. But with the utmost care a bulb now and then will die, or send up an imperfect flower. To remedy such defects, substitutes from the open ground are brought to fill up the vacancies. For this purpose an instrument is used, called a transplanter. Two of them

are necessary in the operation. They are made of a piece of best tin plate, eighteen inches by twelve, bent into the form of a cylinder, or tube, twelve inches long. The two edges that meet are not soldered together, but mounted with counter, or rather alternate placed, loops, which range with each other when the tube is closed to admit a wire to pass through them, thereby connecting the whole securely together. On the sides, at the upper end, two substantial wrought-iron handles are riveted, and which serve to press the tube into the soil containing the plant to be moved. It is then drawn up, plant and earth attached, without disturbing the roots. When this is discharged in its new place (and which is ready opened by the other instrument), the connecting wire is drawn out of the loops, which allows the tube to spring open a little, and easily to quit its charge.

There is another and easier plan, practised by florists, for filling up gaps in their show-bed. Phials of water are sunk below the surface in the vacant spaces, and flowers only from the borders

are stuck in from time to time, to make up the deficiencies.

When the bulbs are taken up, "they should be gradually dried, and placed in a situation where they remain so." About the end of August they may be looked over, and divested of their loose skins, dead fibres, and the offsets, which come off easily. The last should not be torn off rashly from the radical plate, as this would make large wounds, hurtful to the organization, or allow its juice to escape.

As the best bulbs are all named, it is necessary they should be kept unmixed. For this purpose, the plan of Van Osten is as convenient as any other. It is a press, or box of shallow drawers, having folding doors; the bottom of the drawers is divided into square compartments, each only large enough to hold a single root. Corresponding numbers on the compartments and in a book ruled in squares, and both similar to the arrangement and stations of the bulbs in the bed, and a numerical list, are sufficient for identifying the kinds at all times.

The usual way of placing the bulbs in the bed is by a regular mixture of the kinds, so that two of a kind or colour shall not stand together, and this for the purpose of giving variety. But regular mixture is not variety. Instead of a bybloemen, bizard, rose, &c. constantly repeated in the same row, and then crossly placed in the next, and again in the third, it would be better, perhaps, that the different kinds were grouped together; not so much from such disposition being agreeable to Nature, because a flower-bed is too artificial an object to receive any such character, but because it would be more convenient for the purpose of comparison. In looking at tulips, we compare those of the same kind with each other—bybloemens with bybloemens, bizards with bizards, &c.; and, therefore, to see their identical or comparative excellencies, they should be placed in juxtaposition. But as this is merely a matter of personal taste, it may be done properly either way.

*Description of a fine Tulip.* The florist's taste differs from that of the common observer:

it is an acquired portion of knowledge ; and founded on a standard fixed by a general concurrence amongst cultivators. A flower may be ample, splendid in colours and appearance, and yet have no merit in the estimation of a florist. He can only admire what approaches his standard ; he must have a certain form, colour, and disposition of colour. Whether the forms and tints so admired be also the most perfect combinations of form and colour is, perhaps, questionable ; but, as such objects have an extra value, the attainment of them is a pleasing pursuit to the amateur, and the possession a profitable one to the professional florist.

The properties of a first-rate tulip are thus described by Maddock ; viz.—“The stem should be strong, elastic, and erect, and about thirty inches above the surface of the bed.

“The flower should be large, and composed of six petals : these should proceed a little horizontally at first, and then turn upwards, forming almost a perfect cup, with a round bottom, rather widest at the top.

“The three exterior petals should be rather larger than the three interior ones, and broader at their base; all the petals should have perfectly entire edges, free from notch or serrature; the top of each should be broad and well rounded: the ground colour of the flower at the bottom of the cup should be clear white or yellow; and the various rich coloured stripes, which are the principal ornament of a fine tulip, should be regular, bold, and distinct on the margin, and terminate in fine broken points, elegantly feathered or pencilled.

“The centre of each petal should contain one or more bold blotches or stripes, intermixed with small portions of the original or breeder colour, abruptly broken into many irregular obtuse points. Some florists are of the opinion, that the central stripes or blotches do not contribute to the beauty and elegance of the tulip, unless confined to a narrow stripe, exactly down the centre, and that they should be perfectly free from any remains of the original or breeder colour: it is certain that such appear very beau-

tiful and delicate, especially when they have a regular narrow feathering at the edge ; but the greatest connoisseurs in this flower unanimously agree that it denotes superior merit when the tulip abounds with rich colouring, distributed in a distinct and regular manner throughout the flower, except in the bottom of the cup, which, it cannot be disputed, should be a clear bright white or yellow, free from stain or tinge, in order to constitute a perfect flower.”

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# HYACINTHUS ORIENTALIS.

## GARDEN HYACINTH.

CLASS, HEXANDRIA. ORDER, MONOGYNIA.

NATURAL ORDER, ASPHODELEÆ.

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THE eastern or garden hyacinth is one of our principal bed-flowers. So much and so long has its cultivation been prosecuted, that it forms a staple commodity of commerce from certain parts of Holland to all the other states of Europe. The Dutch florists excel in the business of raising hyacinths and other bulbs, and on a scale more like agriculture than horticulture. They have, in fact, engrossed almost the whole trade in bulbs. In this they have been no less fortunate in possessing a peculiarly suitable soil than they have been

from a very general belief, in surrounding countries, that bulbs can be no where else cultivated with success. This idea, so favourable to the Dutch trade, has, however, been doubted, and now is proved to be fallacious. For, though there is no where else in Europe such extensive tracts of comparatively rich sand as they have in Holland, which could be appropriated to the cultivation of flower-roots, yet, for all the purposes of the British florist, the soil can be imitated with but little expense or trouble. It is not the natural soil that the Haarlem florists trust to; they form their compost for the propagation of, as we do for flowering, them; and there is no question, but that hyacinths, as well as other bulbs, may be as well cultivated in England, especially near the coast, as they are in Holland.

One circumstance, however, must not be forgotten: full-sized bulbs imported from Holland, or from any other country, will thrive better, only from change of air and other circumstances, than home-bred bulbs, roots, or seeds of

any kind ; exactly as English bulbs, &c. would do if exported to Holland. But, independent of change of place, hyacinths may be cultivated any where in the same latitudes, provided they are properly treated. This has been confirmed by many men of the first ability and veracity.

The most suitable soil for this plant is a free rich sand, or sandy loam. This is evident from the character of that preferred for it in Holland, and the experience of those in this country who have made the cultivation of the hyacinth their study. Saline qualities, which impregn the air in Holland, and also the soil, which has been chiefly reclaimed from the ocean, are supposed to be peculiarly necessary and favourable to the growth ; and, from a recent trial by the ingenious Mr. Hogg, as published in the *Gardener's Magazine*, No. X, it seems to be clear, that a moderate quantity of salt employed in the compost is a suitable ingredient.

That water contains much of the elemental food of the plant is evident from the perfection in which they are flowered in it. The practice is

therefore perfectly right, in storing the compost with matters retentive or attractive of that element, which both rotten cow-dung and salt decidedly are ; and placing a stratum of the former at ten inches below the bulbs is also most rational.

The soil prepared for the hyacinth in this country is an imitation of that used by the Dutch florists; it is composed of four barrowfuls of fresh maiden sandy loam ; one ditto well rotten cow-dung ; two ditto leaf-mould, well reduced ; two ditto sea or river sand ; and to this is added one barrowful of old night-soil, all well incorporated together. This is said to retain its virtues for three years ; but an annual addition of the ingredients near the surface will always be acceptable to the bulbs, more especially to those reared on the same spot.

Maddock's compost is made of one barrowful of coarse sea or river sand ; one ditto sandy loam ; half ditto rotten cow-dung two years old ; and a quarter ditto of leaf-mould.

Mr. Campbell, in *Gardener's Mag.*, No. VIII., asserts, as a general axiom, that wherever the

onion will thrive, the hyacinth will succeed. A well-trenched free soil, with a liberal allowance of rotten dung turned in, as well as laid three inches thick over the surface, are the only means employed by this successful florist to insure fine bloom, unfailing bulbs, and luxuriant true progeny.

Hyacinths may be raised from seed ; but it is a tedious process, and the chance of obtaining superior sorts very precarious. Seeds are chosen from the handsomest single, or rather semi-double, flowering plants, when the capsule becomes yellow and the seeds black. The stem with the seeds should be kept in a dry and airy place till the time of sowing, which may be done either in the end of October or beginning of March. A deep box, filled with the common compost, serves as a seed-bed ; the seeds, when sown, are covered about half an inch. The box must be kept in a warm place during winter, and defended from frost. After two years, and on the approach of winter, the little bulbs should have an additional covering of compost, and in

the third year may be taken up, and afterwards managed as offsets.

Offsets are managed by being kept in nursery-beds till they become of full size, which they usually do in the third or fourth year.

Hyacinths, whether raised from seeds or offsets, have an infancy, youth, and mature age. The first is that from the time they are independent beings till they flower; the next stage is from their first flowering till they arrive at their utmost vigour and volume; and the last is that natural size which they continue to assume so long as they continue in health and free from accident, and which (barring accidents) may be, by the assistance of art, prolonged for ever. It is true, that a full-grown bulb shews at last a kind of decrepitude; but this appears to be caused by mismanagement, or want of change of soil or situation, rather than to any natural exhaustion of the vital principle.

It is quite rational to conclude, however, that the hyacinth, like all other vegetables, may fall into a kind of old age, and at last become extinct.

Even the sturdy oak, the towering produce of five hundred years, though its progeny may shade a thousand acres round, at last crumbles into dust!

In Holland, a full-grown bulb is said to continue in perfection for a dozen years: in this country it has been long erroneously believed that they do not continue more than two or three. This mistake is much in favour of the Dutch commercial florists; and it is a pity that British florists should be swayed by it. Surely a full-sized bulb will continue its vigour till its own offsets can take its place; unless, indeed, their culture costs more than new-imported ones.

This error, about the deterioration of bulbs, has chiefly arisen from the belief that bulbs are permanent; that the bulb of last year will be planted in this, and again in the following. But the identity is only apparent, not real; that part of the bulb which flowered last year is perished and gone, except a small portion of the bases of its leaves, which now form the outer coat of this year's bulb; and this, which now looks so plump

and perfect, will be almost invisible when taken up in the next. The outer coats of the hyacinth are discharged gradually and imperceptibly, the increments of the bulbs are added from within, and, consequently, the transmutation is invisible.

The suitableness of the soil and situation in which a hyacinth is placed not only assists the bulb of the present year to expand itself with the greatest vigour, but also indirectly invigorates and stimulates the incipient successor into greater volume and power to expand itself in its turn. The soil is therefore the principal auxiliary of the florist. By the constitution and components of this, all the changes produced in the amplitude and colours of the flowers, compared with their natural simplicity, is to be attributed. The double hyacinth is a child of art; and when we consider the vast difference that exists between this and its diminutive original in the wilds of Persia or Greece, we cannot but admire the florist's skill or labour in accomplishing such results; especially as the art is progressing, and probably still far from perfection.

The bed for hyacinths should be prepared for their reception during the month of September. The natural soil, whether suitable or not, should be trenched three feet deep, for reasons before given. Of whatever description it may be, eighteen inches of the surface should be removed to make way for a previously prepared compost. If the bed be raised by boarding, the natural bottom on which it stands should be sufficiently loosened, in order that the whole mass of compost and earth under the bulbs be of the same texture or consistence. The bed, whether boarded or not, should be made up to within three inches of the desired height, and smoothed into form to receive the roots.

St. Crispin's day (25th October) is a good time for planting. If the bulbs are put in much earlier, except in countries farther north than London, they may be hurt by being too much advanced in mid-winter; and if kept out of ground after this time, they begin to vegetate in the drawers, or on the shelves; which, if they do, it has a tendency to weaken them.

Single-flowered hyacinths may be planted earlier, and will blow earlier than the double ones ; on which account they are usually planted by themselves.

The beds are commonly made four feet wide, which allows six rows to be planted lengthways, at the distance of eight inches asunder, leaving four inches between the outside rows and the sides of the bed : the distance between bulb and bulb in the rows is also eight inches.

The bulbs should be placed on and covered with white sand, as directed for tulips ; this being considered as a preservation from damp and insects. They are then covered with compost three inches thick, if the surface is to receive no other covering ; but if intended to be covered with two or three inches of well-rotten dung about the beginning of December, a covering of one inch thick of compost will be sufficient. Another mode of covering I have practised, which is to cover the bulbs, in the first place, with about two inches of compost ; and, before the frost sets in, adding a top cover-

ing of fine sifted and perfectly decayed bark, about one inch thick. This assists to keep off the frost in winter and the bed cool during the flowering season. It also allows of a harmless practice of showing the flowers to the greatest advantage ; viz. giving the surface a slight watering about an hour before the flowers are to be shown to company. A dark-coloured back-ground is thus given to the flowers, and a freshness to their colours which is truly pleasing and well worth the labour.

It is not the practice to water bulbs at any period of their growth ; and certainly, if the compost contains substances which are retentive of humidity, or if there be a layer of moist dung at the proper distance below, it is perhaps unnecessary during the short period of their spring growth. Otherwise, I see no reason why the hyacinth should be denied the “ vernal showers,” so invigorating to all vegetation.

Soon as the points of the leaves appear above ground, hoops should be fixed, and mats or canvass coverings laid ready to be used against the

occurrence of very severe frost, heavy snow, or violent rain. Slight frost or rain does no injury ; indeed there is more fear of over-covering and preventing a full share of air and light than of over-exposing the bed to the weather.

If a bulb be frozen through, it and the flower will be killed, though the offsets may escape ; and, if the exterior coats only be frozen, a diminished stem and flower will afterwards be produced ; but few or no leaves. This, it may be observed, is a circumstance frequently witnessed in vegetation, and particularly bulbs. If the exterior of a bulb be chilled by cold, or over-dried by warm air, its central and more vital part, being free from injury, pushes forth before the leaves, and seems to engross the whole vigour of the system. So, we sometimes see, under the influence of the mid-day sun, the flowers of a plant remain erect and rigid, while its leaves are flaccid and drooping ; because the flowers depend on the central vessels, which are less exposed to desiccation than the exterior. Branches of evergreen trees, as the holly for instance, when denuded of every leaf, and

fast verging to decay, will put forth their flowers as the last effort of life: even the pine-apple plant shows the same phenomenon.

It is well, therefore, to defend from severe frost; though, during the months of January, February, and March, as much free air must be admitted as the state of the weather will permit.

In ordinary seasons, it will be towards the 1st of April that the flowers will begin to shew colour. The awning should now be erected, to guard against the effects of too much sun. It is needless to reiterate how much shading enhances the pleasure and continues the beauty of a hyacinth-bed. It gives time to examine and admire their distinguishing characters, and inspect their respective excellencies. It is desirable the collection should come into flower together; and, to accomplish this, the accurate florist takes care to plant the early blowers a little deeper than the late ones.

The next attention which the flowers require is to be prepared with propping-sticks and ties. The former should be made of oak or deal, three-

eighths of an inch diameter, and pointed at bottom, tapering off towards the top, painted green, and sixteen or eighteen inches in length. These, stuck in with care behind the bulb, are necessary for the support of the flowers when their weight bends the stem. Green worsted ties are the least conspicuous: encompassing both prop and stem in loose collars, they rise with the growth of the latter without confining it in any part.

Thus prevented from falling by the props, and defended from sun and wind by the awning, the flowers will continue for nearly three weeks a pleasing and interesting spectacle. The healthy freshness of their forms, the splendour of their colours, and their grateful sweetness of scent, are a fascinating treat even to those the most dead to the charms of Nature: but to the lover of flowers, or genuine florist, it is a gratification of the highest order, enhancing all the other enjoyments of life.

Soon as the general beauty of the bloom is over the awning should be immediately removed, in order that the plants may enjoy the full air and

light ; for, if the weather has been such during the bloom that it has been much used, the health of the plants will be somewhat impaired. They will not have that constitutional vigour which a full share of air and light would have imparted ; and therefore should be exposed as soon as possible. The hoops may however be replaced, to allow of covering with mats, &c. in case of excessive rain.

When the stems and leaves become yellow and withered, which usually happens in about a month after the bloom, the bulbs should be taken up and laid on the surface of the bed, and lightly covered with sand or with part of the compost. If it be a named collection, each bulb is taken up and laid on the same spot sideways, and there covered over for the space of three weeks, to ripen, as it is called ; that is, lulled into perfect repose before they are consigned to their places in the store-boxes. When the time arrives to do this the bulbs are taken up one by one, the dead remains of the stem and leaves are cut off close, the loose skins and fibres cleaned away, and the

largest offsets separated, which, with the bulb and tally, are placed in their respective cells in the drawer. In the drawers they are exposed to the dry air of a room till all perceptible moisture is dried up, when they are again placed in the cabinet, to remain till planting time. 'This orderly way of disposing the bulbs prevents all confusion or chance of mixture, and saves much trouble in papering and numbering in the common way. But, where the collection is not named, the bulbs, when first taken up, may be laid out of the way in any bye corner to ripen, leaving the bed clear for any other purpose of the flower-gardener.

Where no bulb-case or cabinet is used, they may be kept on dry shelves in moderate temperature, either in paper or without.

Collections of hyacinths are kept up by supplies of offsets from the nursery-beds, or by purchases from the seed-shops. Florists reckon that one in twelve is lost every year by accidents, insects, or disease.

*The properties of a fine double hyacinth.*—The

stem should be strong, tall, erect, supporting numerous large bells, each supported by a short strong peduncle or foot-stalk in an horizontal position, so that the whole may have a compact pyramidal form, with the crown or uppermost bell perfectly erect.

The bells should be large and perfectly double; i. e. well filled with broad, bold petals, appearing to the eye rather convex than flat or concave: they should occupy about one half the length of the stem.

The colours should be bright, whether plain red, white, blue, or yellow, or variously diversified in the eye: the latter give additional lustre and elegance to the flower.

Strong bright colours are in general preferred to such as are pale: there are, however, many rose-coloured, pure white, and light blue hyacinths in high estimation.

Some sorts consist of petals of different colours; such as light reds, with deep or red eyes; whites, with rosy, blue, purple, or yellow eyes;

and yellow, with purple in the eye, &c.: others again have their petals striped, or marked down the centre with a paler or deeper colour, which has a pleasing effect.

It sometimes happens, and with some sorts more than others, that two stems are produced from the same root: one is generally considerably taller and stronger than the other. “When this is the case, the weaker may be cut off near the ground, soon after it makes its appearance, or suffered to bloom, and its bells be intermixed with the lower ones of the taller stem, so dexterously as to appear like one regular pyramid of bells.”

This last-mentioned circumstance is a sign of the superior vigour of the plant: in fact, it is nothing less than the flower of the next as well as that of this year coming together; so that the third of the series will succeed to the place of the second. This exuberance of growth is very frequently seen in cottage-gardens, where the bulbs have been but recently introduced, in the

absence of all floricultural art; showing most decidedly how much the hyacinth, like almost all other plants, delights in a change of situation and of soil.

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# NARCISSUS TAZETTA.

## POLYANTHUS-NARCISSUS.

CLASS, HEXANDRIA.

ORDER, MONOGYNIA.

NATURAL ORDER, AMARYLLIDÆ.

THE next bulbous-rooted flowering plant in order and estimation is the polyanthus-narcissus. It is a more robust plant than either the tulip or hyacinth; consequently requires less care in management and preservation. In the structure, mode of growth, and manner of reproduction, it resembles the hyacinth in every respect; and the directions for the cultivation of the one are equally applicable to the other. Hyacinth compost suits them well: the richest portion below, and the bulbs themselves placed in a lighter-surface stratum.

There is a considerable importation of these bulbs, from both Holland and Italy, every year;

chiefly for the purpose of being flowered in pots and glasses for the decoration of drawing-rooms and conservatories. This trade affluence encourages, because it is convenient. The British cultivator, however, whether private or commercial, is not compelled to have recourse to an imported supply, so long as he can obtain from his own management as perfect bulbs as can be had from abroad; always excepting the effect of change of place, which has a very powerful influence on the energies of plants.

When polyanthus-narcissus are planted in beds or borders it is customary to let them remain for two or three years without removal. But this is not the best management; because the offsets become numerous, and, remaining attached to the system, withdraw a part of the vigour which it is desirable should be expended only in the production of the flower of the present year, or in increasing the size of the successor-bulb of the next. The Dutch florists take them up every year, as they do their other bulbs; by

which means they concentrate the growth, and so bring better (i. e. larger) samples to market.

There is a special difference in the management of private and commercial growers, as regards the polyanthus-narcissus. The former cultivates for the sake of the bloom ; the latter chiefly for propagation. To propagate with success, and ensure a return of large bulbs which will flower well, no flowers should be allowed to expand the previous season. Pinching off the flower-stalk stimulates the growth of the other parts, and furnishes, for the next year, bulbs in no degree inferior to newly imported ones. The private grower, in order to have always a respectable succession, should therefore deny himself the gratification of a full bloom this year, for a partly fine bloom in the next. By dividing his stock into blowers and breeders, alternating in station and treatment with each other, and by carefully nursing the largest offsets, he may always maintain a good collection.

Cutting off the leaves of this plant is particu-

larly interdicted by florists. This rule is more regarded in England than it appears to be on the continent. The Dutchmen are less tender of the foliage than we are ; nor do they seem to attribute to the leaves that peculiar function which is given them by the botanical physiologists of this country. Perhaps certain ideas, like diseases, are endemical. But as to the question whether or not the cutting off the leaves while in vigorous growth be detrimental, there can be no doubt of the affirmative. In this case, Nature shows what is right. Every distinct member of a plant is certainly necessary to each and all the other parts. And although Art may direct or regulate the tendencies of parts of members, no distinct member contributing to the growth can be taken away without injury.

The first of October is the proper season for planting the polyanthus-narcissus. The bulbs should be put four or five inches deep in the ground ; and, during severe frost, should have a covering of old bark, dry fern, or mats ; as the

points of their leaves are liable to be killed if too much exposed.

When in flower, shading is necessary to prolong their beauty ; and, when the leaves become yellow, the bulbs may be taken up, dried, and stored.

There are several varieties of this narcissus, all of which require the same management, and which, indeed, is suitable for the whole of this extensive family, from the delicate jonquil up to the rustic daffodil.

All the lily and fritillary tribes that are sufficiently hardy—crown imperials, martagons, &c.—may be cultivated by means similar to what have been recommended for the preceding. The white and orange are so hardy, that they are met with as old standards in every garden. It is a wonder that seedling varieties have not yet been had, by cross impregnation, from those two species. The smaller species should be planted in patches or beds by themselves.

There are many bulbs of minor importance and character, which have always a place in the flower-

garden ; but as they are easy of culture, and thrive in almost every situation, they need no particular notice, further than to observe, that, whatever has been advanced relative to the conformation, peculiar properties, or habits of bulbs in general, are applicable, more or less, to all kinds, whether superior or inferior. Of these, the snow-drop, various sorts of hyacinth, squills, bulbocodium, uvularia, crocus, corn-flag, &c. are among the number, and all well known. It is doubtful, however, whether the crocus and corn-flag can be ranked as bulbs, they partaking more of the character of tubers than of bulbs.

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OF  
TUBEROUS-ROOTED BED FLOWERS.

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THE distinction between bulbs and tubers is not very well defined. If only those were called bulbs in the sense in which Evelyn uses the term, i. e. tunicated, or composed of abbreviated leaves, there would be no confusion. The introduction of the term *bulbous solidus*, by the early botanists, has led to much uncertainty in subsequent descriptions. The first of this character to be noticed is the

## ANEMONE CORONARIA.

### POPPY, OR CROWN ANEMONE.

CLASS, POLYANDRIA. ORDER, POLYGYNIA.

NATURAL ORDER, RANUNCULACEÆ.

THE brilliance and variety of colours displayed in the flowers of this half-hardy exotic, have long attracted the notice of the florist, and raised it to the rank of a bed-flower. It is one of those whose extreme delicacy of structure shrinks from the full blaze and withering effects of a summer sun, and therefore is destined by Nature to come forth under the mild temperature and light of a vernal sky. The rigour of our winters, which is more extreme than that of their native habitat, imposes on the florist a particular care in the management, to give these strangers all the advantages of our temperate climate, while they are defended from the severity in the early, or occasional dryness during the latter, part of their seasonal life.

The natural history of the anemone is briefly this:—It rests in summer; and, soon as the autumnal rains set in, it comes into action, expands its leaves and flowers (probably during our winter), and ripens its seed in the spring: when these decay, the vitality becomes stagnant, and remains secure in the bosom of the tuber.

Thus, while the generality of plants are prompted into action by the return of spring, to be perfected by the increased heat and light of summer, the anemone is one of those that shuns the warm season, remaining dormant till the parching heats are past. Many plants are similarly actuated. It has been already observed, that some flowers cannot bear the light, if combined with a high degree of heat: but no conjecture has been offered why this must needs be so. I shall here, therefore, risk an opinion, and an opinion only, on the subject:—

“Nature does nothing in vain.” Every plant is fitted for the circumstances of the climate of which it is a native. Tropical trees are scarcely affected by a change of seasons, though they are

by changes of weather: the greater number, under their continual summer, are hardly susceptible of a change of temperature. But the plants of the temperate and frigid zones feel summer and winter, in which they are alternately in motion and at rest. Each plant presents its flowers in that part of the year for which the constitution and texture of their blossoms are best adapted. Many icosandrious and polyandrious plants, from the attenuated structure of their stamens and pistils, are unsuited to bear the direct and parching rays of the sun, and, therefore, are expanded early in the spring or summer. This, it appears, is necessary for the safety of the flowers from heat; and such plants from warmer latitudes, having this natural impulse, come forth with us so early, as to jeopardize their existence, and be wholly cut off by frost. To mention a few instances, by way of proof:—botanists have long ago noticed the peculiar precaution, if I may so call it, of the *cactus grandiflora* blowing only in the night. The fruit-grower laments this tendency or habit in his most delicate wall-fruit

trees ; and the florist must bestow considerable labour and skill to check or defend this forward propensity in his favourite anemones.

The anemone is propagated, and new varieties are obtained, by sowing the seed. This should be chosen from the best old flowers impregnated with semi-double flowers, having the desirable properties of rich colour and fine form. The seed, being volatile, should be gathered as it ripens, and preserved in a dry place till the month of January, when it should be sown. It requires to be prepared for sowing by being mixed with and well rubbed in sand, to divest it of its downy covering. The seed-bed should be composed entirely of fresh garden ground or loam, from twelve to eighteen inches deep, which has been well aerated, to free it from earth-worms and insects. And, for the better security against these, a layer of quick-lime, three inches thick, should be laid in the bottom of the bed : and, to prevent the approach of slugs or worms to the surface, the outskirts of the bed should be frequently sprinkled with lime or salt water.

A shallow one-light frame is necessary for the defence and nurture of the seedlings. In this, when the soil is settled and levelled, sow the seeds thickly and equally, and press them into the earth with a board, or back of a spade. The bed should be, and kept, rather moist. While the seeds are vegetating, the glass-light should be kept close; and as they swell and force themselves above ground, a slight covering of loam may be sifted on from time to time, till the seeds are hidden. Air must be given on all occasions, when the weather permits, soon as the plants begin to appear; and, should the bed become too dry, it must be lightly watered. If the surface appear crusted when the seedlings are rising, it must be cautiously loosened with the point of a stick, to give freedom to the plants. This treatment must be continued till the leaves begin to die off; and when they are quite withered, the tubers may be taken up.

As these small roots are irregular in form, and of a dingy colour, they are not readily found, unless two or three inches of the surface be passed

through a fine brass wire sieve, to separate them from the mould. A more expeditious way is by washing it away in water. For this purpose a wide tub of water is used ; the sieve containing the mould and roots, partly emerged in this, is trundled ; the earth falls through, leaving the roots to be picked out, dried, and stowed away in a proper place, to be planted in due season.

These seedlings, planted in a nursing-bed, will for the most part flower the second year ; all that are worthless may be discarded, and the best only kept to breed from, or take a place among the superiors. The finest double varieties are only procurable by a long course of successional sowings from individuals of good colour, and which show a tendency to become double.

The anemone may be also propagated by dividing the tuber. When this becomes old, it rots in the centre ; but as the vital crowns are dispersed over the surface, any portion thereof, however small, containing a crown, if separated and planted, becomes a new plant.

The sleep of the anemone enables the florist

to commence its season at any period during the autumn or winter months. Were he to imitate Nature closely, he would invariably choose the month of October as the most proper in this country; because they get into action before the hardest frost sets in, and which is considered as no small security; and though they must brave all the severity of winter, still, if they receive that protection which it is the business of the florist to afford, they will succeed better than if they had an artificial season forced upon them by deferring the planting for two or three months.

But it is argued, that the frequent covering required to repel the frost, is not only highly injurious, but even risks the existence of the plant; and therefore some persons prefer spring planting, as the safest practice. But it should be remembered that the anemone is a winter, not a spring plant; requiring, in its own climate, a season of at least five months' continuance; whereas, with us, if planted in February, it has only a season of three months, which is too short

a period to allow the full development of the flowers, and necessary enlargement of the tuber; the sudden arrival of our summer checks the growth and hastens on a premature torpidity.

I am, therefore, decidedly of opinion, as well from the nature of the anemone itself as from the concurring testimony of many successful growers, that the middle of October is the proper time for planting. The hazards of the winter must be guarded against with the requisite attention, by defending the bed from severe frost, without depriving it of a full portion of air. How this may be done requires only a few words.

Few persons, acquainted with the effects of frost on vegetation, but are aware that *cold air* descends perpendicularly, or, as it is explained by some meteorological writers, *heat* is radiated from the earth vertically. Heat, a positive, and cold, a negative quality, do not, from their effects, appear to be *much* diffused laterally. A coping on a wall defends the fruit-trees under it: a thin mat will repel frost that, without its

interposition, would have been fatal: a dense cloud, floating high above the earth, shelters the ground and plants below. Coverings for anemones, therefore, should be placed at some distance (say two feet) above the surface of the bed; the sides being left open for the admission of air, except in frosty winds (called black frosts), a curtain should be added on the windward side. Stakes, driven in the ground, and connected by a surrounding rail, will serve to bear straw mats of sufficient thickness to be rolled on and off as they are needed, which will be protection enough.

The habits of the anemone, as being a production of the moistest season of the year, seems to point out the soil most congenial to it; viz. a mellow rich loam. The success of many cultivators who have published their experience yields ample proof, if proofs were wanting, of the suitability of such soil. It is such as absorbs and retains an equable degree of moisture, without repletion or deficiency. And, though surface-water be neither naturally necessary nor suitable,

yet a substratum of rich and permanently humid soil appears to be indispensable.

In forming the bed, therefore, the florist has only to loosen the bottom sufficiently deep: and, about eight inches from the surface, let strong loam and rotten dung be mixed, to form the substratum, and on this a surface-layer of lighter loam to receive the tubers.

The bed being formed and levelled, drills are drawn across about five inches asunder, in which the roots are placed, crowns upwards, four inches or more apart, according to their size, and covering them as near as possible about two inches deep. Sometimes sand is strewed under and over the tubers; but this is not absolutely necessary.

Having already adverted to the winter management, the next thing in course is what should be attended to before and at the time of flowering. If the winter has been mild and without much frost and snow, and all other circumstances favourable, the plants, in the course of the spring, will be looking well. If the month of March,

as sometimes happens, has been dry, the bed should be examined; and if the surface has become loose, it should be stirred; a little fresh loam added, and pressed close to the plants. The subsoil should also be examined; and if it appears not sufficiently damp, a good soaking of manured water should be immediately given. It is wrong to wait for indications from the leaves of a want of water, because leaves attached to a bulb or tuber show a vigour which does not entirely arise from the state of the soil; and therefore the soil should be examined and treated accordingly. If insects of any kind have taken possession, they should be dislodged.

When approaching to flower, unless sufficient rain has fallen, occasional watering may be necessary; and, as they come forward in bloom, both shading and watering will be required.

If the weather at this time be fine and dry, the tubers, after flowering, will ripen regularly of themselves; but, if cold and wet, it will be necessary to protect the bed from rain: otherwise, the tubers will be kept in a state of excitement,

and be thereby enfeebled for future exertion. This is a material point in the culture of the anemone, and deserves particular attention. It seems that our summer should resemble their own; that is, to commence so as to stop their growth instantaneously, and allow the tubers to ripen in perfect drought. Checking all growth by such means, the leaves will soon begin to change colour; and, about a month after the bloom, the roots may be taken up, carefully cleaned, dried, and stored up.

*The properties of a fine double anemone.—*

“The stem should be strong, elastic, and erect, not less than nine inches high.

“The blossom, or corolla, should be at least two and a half inches in diameter, consisting of an exterior row of large, substantial, well-rounded petals or guard-leaves, at first horizontally extended, and then turning a little upwards, so as to form a broad, shallow cup, the interior part of which should contain a great number of long, small petals, imbricating with each other, and rather reverting from the centre of the flower :

there are a great number of slender stamens, intermixed with these petals; but they are short, and not easily discernible.

“The colours should be clear and distinct when diversified in the same flower, or brilliant and striking if it consists only of one colour, as blue, crimson, or scarlet, &c.; in which case, the bottom of the exterior petals is generally white; but the beauty and contrast are considerably increased when both the exterior and interior are regularly marked with alternate blue and white, pink and white, &c. stripes, which in the broad petals should not extend quite to the margin.’

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# RANUNCULUS ASIATICUS.

## GARDEN RANUNCULUS.

CLASS, POLYANDRIA.

ORDER, POLYGYNIA.

NATURAL ORDER, RANUNCULACEÆ.

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THE natural history of the ranunculus or frogwort is so much like that of the anemone, that what has been said of the one is quite applicable to the other. They are natives of the same latitude ; are perfected in the same season ; thrive in the same soil ; and succeed under the same management.

The ranunculus, however, ranks rather higher than the anemone, because of the very rich and varied colouring of its full turbinated flowers ; and though perhaps not quite so hardy, is flowered with equal facility, and when in flower, is more permanent.

New varieties are obtained from seed in the

same way, and by similar management, as is advised for the anemone; indeed, no two distinct genera can be more alike in habitude and constitution. The whole family of the ranunculi, from the *fluviatalis* to the *arvensis*, affect humidity, both of soil and atmosphere.

Different cultivators have different opinions as to the best time for planting the ranunculus. It is, however, very generally admitted, that autumn planting is most seasonable, provided the rigours of winter can be sufficiently guarded against. That the autumn is also the most natural season, has been already shown (and it is trusted proved); and by the mode suggested of sheltering with elevated straw mats, all the objections to autumn planting are answered. It is proper to add, however, that spring-planted beds will succeed; and with judicious management, do constantly succeed, when circumstances of soil, situation, and season, are favourable. If the first four months of the year be temperate and moist, with no bleak easterly winds to dry the earth and

air, the flowers will attain considerable perfection. But the tubers, it is more than probable, will not be so strong to flower the following year. The store of vigour in the tuber is exhausted by the excitement of the spring season in a degree greater than there is time for an equal replenishment: and it may be safely repeated, that success from spring-planting is only in a degree, and certainly less than would follow equally fortunate autumn-planting.

There are only a few particulars in which the management of the ranunculus differs from that of the anemone. The first is in preparing the seed for sowing, which instead of being separated by rubbing amongst sand, is scraped from the receptacle with a blunt knife; dividing it so as not two or more remain together in the husks. The next particular is in the planting; that care be taken not to bury the tubers deeper than an inch and a half. The bed, too, besides the natural tendency of such a compost to settle closely together, should be, in some degree, consolidated by

the action of the spade, to resist the entrance of air, which appears to be less necessary to the roots.

Before and when coming into bloom, the surface of the bed should be kept pretty solid and moist by mulching and occasional watering with manured water. Shading will preserve and prolong the beauty of the flowers; and all subsequent treatment to be observed as directed for the anemone.

Ranunculus tubers have been already described. They increase themselves by viviparous progeny; but the connecting runner between the old and young plants is usually so short, that they appear as one and inseparable. This, however, is not the case: if the runner be cut by the point of a knife, neither the old nor young one will be damaged; and, by such means, the kind may be multiplied without end.

*The properties of a fine double ranunculus.*—  
“The stem should be strong, straight, and from eight to twelve inches high, supporting a large, well-formed blossom, at least two inches in dia-

meter, consisting of numerous petals, the largest at the outside, and gradually diminishing in size as they approach the centre of the flower, which should be well filled up with them.

“The blossom should be hemispherical; its petals should be imbricated in such manner as neither to be too close and compact, nor too widely separated; but have rather more of a perpendicular than horizontal position, to display their colours with better effect.

“The petals should be broad, and have perfectly entire, well-rounded edges: their colours should be dark, richly clear, or brilliant, either consisting of one colour throughout, or be variously diversified, on an ash, white, sulphur, or fire-coloured ground, or regularly striped, spotted, or mottled, in an elegant manner.”

There are more numerous varieties of double ranunculuses than of any other flower; and it is one that may be flowered at almost any time of the year, merely by changing the time of planting. “For a bloom in September or October,

plant about the middle of July. For a bloom all the season, commence in February, and plant every fortnight or three weeks; in September, plant in a frame, and you will have a bloom about January or February.”—H. GROOM, *in Trans. Hort. Soc.*

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## PRIMULA AURICULA.

### GARDEN AURICULA.

CLASS, PENTANDRIA. ORDER, MONOGYNIA.

NATURAL ORDER, PRIMULACEÆ.

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THE auricula (or bear's ear) is the beau of the flower-garden; and, though a native of a poor alpine region, yet, when introduced into the more refined ranks of floral society, no other plant assumes a more gaudy dress, nor more capriciousness of taste and feeling. To gratify this artificial character and appetite, the florist ransacks every description of mineral, vegetable, and animal matter—from the mildest maiden loam to the most filthy and abominable substances—to furnish a repast to satisfy the palate and vitiated taste of this fastidious fop of the flower-bed. Divested of its native hardihood

when brought into the sheltered parterre, it becomes too delicate and too much valued to be consigned to the bosom of its mother earth. The breath and beams of heaven must not "visit its face too roughly;" requiring defence as well from the summer heat as from the winter's cold.

It is a vernal flowering plant; but, unlike bulbs and some other tubers, it is not a sleeper. In the whole art of floriculture there is nothing more difficult than to grow the auricula plant to a great and vigorous size, and yet retard its showing flower till the proper season. This is a point requiring particular consideration; and, luckily, the practical experience of eminent florists is on record, which, with some additional observations, will show the most approved means to gain this desirable result.

The root of the auricula is a long, irregular, branching tuber, furnished by fibrous permanent radicles, very much in the style of the iris family. It is increased by gradual elongation upwards, and as gradually dying off at the bottom. Hence it is the nature of the plant to rise out of the

ground, and consequently to be the better for earthing up. When its "spurious stem," as it is called by some writers, rises to a certain height, it, from laxity, reclines on the ground and there takes root, and in this manner naturally propagates itself.

The apex of the principal and each of the other branchlets bear the leaves and a cluster of flower buds, which are developed therefrom in irregular succession—the most central usually first, and then the next according to its strength or seniority. The base of each bud (and on which the leaves are seated before they decay) is permanent, and becomes a component of the stem, entering intimately into its organization. All the leaf buds are not developed while they are on the summit of the shoot, but remain dormant in the stem, from whence they occasionally issue as branchlets. Radicles proceed from all parts of the stem also, showing that any part of the stem may be nursed into a perfect plant.

It sometimes happens that the senior bud, containing the embryo flower, is accidentally

either wholly or partially damaged. In either case it will immediately be succeeded by the next in order. If the flower only of the first has sustained injury, it may come forth; but it will be defective in colour, though its successor will be perfect both in form and colour.

That the auricula is partial to dry air and situations, is perfectly obvious from its history—from experience in its cultivation—and particularly from that curious peculiarity of constitution by which it covers itself with dust. Whether this be an efflorescence of the exterior cuticle, or a concreted exudation of its juices, is, perhaps, not yet ascertained; but it is quite rational to suppose, that it serves as a defence against rain. Water “conglobing on the dust,” is a circumstance noticed by every body, and often alluded to by poets; and no doubt this elegant formation is a necessary provision of Nature for the preservation of the plant. At any rate, it furnishes an excellent practical lesson to the cultivator; as it is one of those silent yet significant hints which should always be regarded by the practitioner as

assisting in the right treatment of the plants under his care.

The auricula is propagated by seeds to procure new varieties, and by slips, to multiply and continue the old favourite ones.

In raising them from seed, the most important part of the business is procuring in the first place the offspring of estimable kinds. The usual precautions are removing the breeders away from amongst the common and mixed sorts; placing them in the company of such only as possess valuable properties (a transfer of which would be desirable), and encouraging them by every practicable expedient to perfect their seeds. This is the simplest and easiest plan; but no doubt new and much improved varieties might be obtained with much more certainty, and very little more trouble, by the ordinary means of cross impregnation. The manner of doing this has already been described; and nothing more need be added in this place, save the advice to choose varieties of the finest forms and deepest colours for the experiment: divest them of their

own anthers, and impregnate their stigmas with the anthers of the various coloured sorts whose tints, or position of tints, are wished to be conveyed. Or, if it be, as it often is, desirable that the properties of two good ones should be interblended, crossing the anthers of each to the stigmas of the other may effect the object; always taking care that the organs are in the proper state for such manipulation, and that the plants, after impregnation, be safely defended from rain and ardent sunshine.

The breeders are assisted to ripen their seed by being placed in a situation and aspect not liable to the vicissitudes of the weather or of a summer day; that is, where they may receive only the morning and evening sun, but not the noon-tide heat. Decayed, or supernumerary florets (or pips, as they are technically called) should be cut away, leaving only the most promising to mature their seed. When the capsules become dry and brown, they should be gathered and kept in a cold and moderately damp, rather

than in an over-dry place, till the month of January, when the seeds should be sown.

Boxes, large-sized pots, or seedling pans, are indifferently used for seed-beds; and various stations are assigned them, as opinion, or rather as convenience allows. Within striking, or hand-glasses—a cucumber-frame—the front of a green or dwelling-house near the glass—or in a sheltered place in the open air (the pots being covered with plates of window-glass)—are all recommended. But, certainly, the most expeditious way is raising the seedlings in a mild hot-bed, especial care being taken to guard against the warm steam. Such a stimulus brings up every perfect seed, and particularly the weakest, which generally turn out the best flowers; and which there is a chance of losing, if no assistance be given by the application of artificial heat.

Too much attention cannot be paid to the effectual drainage of the pots, &c. intended for auriculas. The plant is very soon damaged by water becoming stagnant near its roots. Ar

oyster-shell whelmed over the hole in the bottom of the pot, and this covered with a layer of small stones or cinders, will readily allow all excess of water to escape.

When the pots or boxes are thus drained and filled with the proper compost, it should be shaken and pressed smoothly down full half an inch below the rim, leaving the middle rather higher than round the sides. On the surface the seeds are dropped as regularly as possible, and covered with finely sifted compost to the thickness of a crown piece. Water is given immediately, applying it as lightly as possible by a patent syringe or otherwise, so that the surface, or seeds, be not disturbed. The pots are next placed in their stations, and the glasses put on. Here they must be guarded against the approach of earth-worms and insects—ventilated by occasionally taking off or raising the glasses to prevent mouldiness—and gently watered or shaded when either appears to be necessary.

All such attention must be continued up to the time the plants are fit to handle; they are

then pricked out, two inches apart, in middle sized pots, in which they are nursed till the month of August, when they are again transplanted singly into the smallest sized pots, viz. sixties, or three together at equal distances, round the outside of forty-eights. Here they remain to flower; and then comes the most interesting period of their culture. The hopes and curiosity of the florist are wound up to the highest pitch. If he happens to have raised a fair portion of third and fourth rates, he regrets neither his toil nor trouble, though he may have many pin-eyed flowers to reject: if a few second rates, he is highly gratified; but if he has succeeded in raising a prime superior flower, he enjoys unqualified delight.

Emmerton, who has written with much ability and minuteness on the culture of the auricula, gives his advice as to the best kinds to breed from, viz. "To breed fine light-green, green, or grey-edged seedlings, plant two of Barlow's king, and four of Grimes's privateer, in a pot. To breed fine green-edged seedlings, take three

of Barlow's king, and three of Pollit's Highland boy. To breed choice-tinted violet ground-coloured seedlings, with green edges, plant three of Bunless's superb, and three of Fadin's victory, in a pot. To breed fine white-eyed seedlings, put together three of Schooley's Mrs. Clarke, and three of Taylor's incomparable, in one pot."

Placing such kinds, or any others having like properties together, and further aiding the impregnation by manual assistance, would go far to ensure success.

Successful management of the auricula depends very much on the suitableness of the compost prepared for it. It has been found by experience, that the plant submits to a high degree of cultivation; and, like many others, it becomes in the garden entirely the child of art, and almost a new being. Mr. Hogg has very justly said, however, that though a plant may be greatly changed by cultivation, it still retains some of its aboriginal predilections; and though the auricula seems voluptuously willing to partake of whatever store of good things are provided for its

roots, it persists on its natural propensity for pure air and dry situations; insomuch, that no care or attention, it is said, can make it prosper in contrary circumstances.

The different substances which have been employed in composing a soil for the auricula, are maiden or fresh loam; the droppings of sheep, horses, or oxen; desiccated or very old night-soil; dung of pigeons, poultry, and particularly that of geese; blood from slaughter-houses; sugar-baker's scum; leaf mould; moor earth; ashes of burnt vegetables; and sea or river sand.

Some curious cultivators have used certain portions of all these substances together; but, as Mr. Hogg observes, not to the advantage of their plants, but the reverse. One famous grower used only one-third loam, two-thirds sheep-dung and well rotted hay litter from sheep-houses, and one-tenth coarse sand. This answered the purpose well. Mr. Hogg's own compost is made of one-third fresh yellow loam, one-third well rotten cow-dung, one-third night-soil two years old, one-third leaf mould, and one-tenth sea or river

sand, all well prepared and incorporated together. And though he, as opportunity offers, adds indiscriminately the dung of sheep, horses, cows, poultry, pigeons, night-soil, and blood, to his compost heap, he yet seems to approve of the opinion of the Lancashire florists, who maintain that the Londoners are too particular in their choice of substances, and that a much simpler composition would answer the same end. At the same time he approves Emmerson's compost of goose-dung, blood, and night-soil; loam, and sugar-baker's scum, of each one-third, for top-dressing in February; and recommends something similar for strong blooming plants.

Such are the composts which florists have found most suitable for the auricula. Their basis is fresh maiden loam, made light and porous by vegetable matter, as decayed straw, hay, leaves, or rotten wood, and enriched by animal qualities contained in the ordure, blood, or other parts after decomposition. To prevent composts becoming an abode or nestling place for worms and the larva of insects, they should be sprinkled

moderately with hot lime and salt, and frequently turned and exposed to frost. Some importance is attached to the time they have been mixed; some authors advise them not to be used in less than two years. It certainly seems necessary that the crudities of the different ingredients should be somewhat neutralized, or at least qualified by frequent turning and exposure. Every flower-grower should have at command an abundant store of such matters, either separate or mixed up, to which he can have recourse on all occasions.

*Shifting.*—There is a difference of opinion relative to the time of shifting the auricula. Maddock thought, and many other florists think, that the best season is that immediately after the flowering; because this, following the great effort of perfecting their bloom, finds the plants in a state of exhaustion or rest, and consequently better fitted to undergo such an operation. This, however, is an argument founded on their artificial, rather than on their natural character; because it is obvious that the ripening their seeds

is the grand object and effort of the auricula, as well as that of all other plants. If, therefore, they have a season of rest, it must be after the latter event, not the former. For this, among other reasons, I am decidedly of opinion that the end of July, or the beginning of the month of August, is the most natural as well as the most proper for shifting the auricula, in order to afford them full time to be re-established in their flowering pots. It is at the same time necessary to add, that as the auricula is almost an ever-growing plant, and less affected by the change of seasons than most other plants are, the individual state of each should be at all times attended to. Some individual plants, from inherent vigour or from peculiarly favourable circumstances, advance before the others, and may require shifting from a smaller to a larger, or from a shallow to a deeper pot, at other than the regular season. A luxuriant-growing plant may require to be divested of its slips and repotted two months before or immediately after flowering; so that in

respect of the auricula, general rules, however good, are not always applicable.

At the general shifting, the state and condition of each plant should be regarded and treated accordingly. Such as have been previously shifted, and have improved in growth during the summer, will only require to be transferred to larger-sized pots, reducing the ball a little by removing part of the old soil from the top and bottom, and repotting with fresh compost. Such as have improved but little, or remained stationary, should receive a more severe examination, by having the whole of the ball shaken off, to see the state of the tuber and roots. Whenever there are signs of decay, the knife must be applied to remove every vestige, whether dead or dying leaves, fibres, or cankerous spots on the tuber; all which defects should be cut or pared away. The balls of all should be reduced more or less according to their state and the appearance of the roots. Such as appear sugged, compacted, and clingy should be entirely shaken off; but, if

porous, sweet, and well occupied by healthy fibres, the upper surface and part of the bottom only need be taken away. The plants should be potted so that their lower leaves be half an inch above the surface of the mould, and this nearly an inch below the edge of the pot. This depth is necessary, in order to admit as large a top-dressing as possible in the month of February.

After being thus shifted and watered, the collection must be placed where there are full air and light, but defended from ardent or long-continued sunshine, and also from heavy and immoderate rain, the drip of trees, and the approach of worms or creeping insects; there to recover and take fresh root, uninfluenced by extreme changes of weather.

It has already been observed, that the stage auricula is wholly a child of art; so much so, that it cannot bear the vicissitudes of the atmosphere with impunity. A certain degree of moisture for the roots, as well as leaves, is necessary at all times; and this can only be applied by the attention of the cultivator. For

this purpose, each plant, when it arrives at a proper age, must not only have its own pot, but the collection must have a suitable platform or stage, fitted for its reception, raised high enough from the damp of the ground, and with coverings to exclude the sun and heavy rain, whenever necessary.

To combine with convenience all the advantages of shade and shelter required by auriculas, a double stage, protected by a double roof, is certainly best. One side of the roof may be glazed lights or panels, and the other boarded shutters of the same dimensions, so that they may take each other's places as the season or state of the plants require. It would be superfluous to give directions for such an erection; so as the principle of its use, connected with convenience, is adhered to, local circumstances and views of the proprietor will direct all the particulars of dimension, place, and form. We may notice, however, a very common contrivance, constructed for keeping auriculas both in winter and summer. It is built in the form of an alcove, placed against a north or south wall according to the season.

Four substantial corner posts are fixed in the ground; the two behind are united by a plate five feet from the ground; the two in front have also a plate six and a half or seven feet high; the two ends and back below the plate are weather-boarded up. The roof is composed of moveable panels, sloping from front to back, of convenient length, fixed by hinges to the back plate, to admit of being thrown back at pleasure. These panels should be water-tight; each having a ledge nailed to its edge, and which over-cills the next panel to cover the joint between; the last, of course, keeping all the others in place. The width of this alcove need not be more than about four feet from the back to the front posts. This will give room for a stage having four shelves dropping in position one below another, on which to set the pots, every one of which will be sufficiently within reach of both hand and eye. Such a frame and stage as this form a very suitable repository for auriculas during the winter months. By throwing back the roof, a warm shower or additional light and air may be occasionally ad-

mitted. The front being open to the southward allows the entrance of the mildest air at all times; and, in severe weather, a curtain of mats, suspended from the front plate, and properly secured at the ends and bottom, will be, with a double mat or two thrown on the roof, a sufficient defence. If such a frame as this, intended for a small collection, were formed on truck wheels so that it might be turned to any aspect, it would serve as well for a summer as a winter repository, and answer all the purposes of a double-roofed frame.

To such a receptacle as this, or to one having all its advantages of shade and free air, should the plants be removed after shifting; and exposed to the east or north aspect, to remain till inclement weather from these quarters renders it necessary to take advantage of the subdued sunshine of a southern sky. Here, throughout the winter, they must be tended as has been already hinted.

*Top dressing.*—About the beginning of February is the usual and best season for supplying every plant intended to flower with a top dressing

of rich, well-prepared compost. The surface-mould in each pot is first carefully loosened with a small stick and taken out; dead or dying leaves are removed by pressing them off downwards: the pots are then filled up with fresh compost, watered, and returned to their places on the stage. While doing this, it is necessary to see that every pot is efficiently drained. If any appear heavy, and have their surfaces covered with conferva or green moss, they should be looked to, lest imperfect drainage be the cause; as nothing is so hurtful to the auricula as an excess of water at the root. At the same time, too, should any slips be fit to remove, they may be taken off and potted; and, though at this season some of the strong growers may require larger pots, this had better be deferred till after they have done flowering.

While advancing into flower, regular watering and effectual protection against frost are chiefly to be attended to. Water should be given moderately and frequently to the root only, and not always over the leaves. If, however, an oppor-

tunity presents itself of exposing the plants to a warm spring shower, they should have the advantage of it. Rain is peculiarly refreshing to all growing plants; special care being taken that a night frost does not reach the plants before they are dry. Protection against frost is essentially necessary at this time, as a very slight attack destroys the fine colours of the flowers. Mr. Hogg advises covering even up to the time of full bloom.

The flowers of the auricula are not terminal; the buds being seated on the sides of the rising stem among the leaves. They are irregularly developed: sometimes a leading one will rise from near the summit, and sometimes from the side lower down. If more than one truss come forth from the same stem, the strongest only should be allowed to stand, if it be wished to have flowers in the greatest perfection: the inferior trusses are in this case pinched off. And when the preferred truss begins to open its florets, these, if too numerous, require to be thinned, so as to leave no more than will compose a well-

balanced bunch of flowers. This regulation of the truss requires some dexterity. It is performed at different times during its expansion: the smallest central florets are cautiously cut out with small-pointed scissors, leaving only from seven to thirteen of the strongest and most regularly placed florets, to rise and form a circular head.

When the flowering season has arrived, if they have not already, they must have a suitable place for this interesting period of their existence; and as they are portable, may be, if desirable, put on a stage or bed, and under an awning erected for other flowers. An exhibition of hyacinths and auriculas may be conveniently shewn together: but, wherever the station, the necessary supplies of water, fresh air, and mild light, must be punctually and amply given, and above all, constantly protected from the withering effects of the noontide sun. Trusses having weak stems, which bend or droop, should be supported by means of wires stuck in the soil, having an horizontally bent hook to hold the stem upright. Watering

with manured water (that is, such as has had dung of cows, poultry, or pigeons, soaked in it) is recommended to be used at this time, as well as previously, for the purpose of imparting high colour to the flowers.

It is always desirable that the auricula should blow fairly; i. e. that the petals of each floret should expand in a plane, and be in no degree cupped. This is considered among professional florists so essential a property of a good flower, that pains are taken to produce this characteristic by exposing cupped flowers to the action of the sun's heat, under glass, slightly shaded. And besides this perfectly rational expedient to give the desired form, they have also small ivory tools with which they lock the petals under each other and turn the outer edges downwards, to alter the cup-like position. 'This is a refinement of taste and management only felt and exercised by those who exhibit their flowers at shows.

Auriculas sometimes present their flowers in autumn. This the florist regrets, because it prevents a fine bloom in the proper season. It is

said to be a consequence of shifting immediately after the flowering season ; but it happens only partially. To ensure a bloom from such forward plants at the proper season, it is only necessary to destroy the autumn flowers the instant they make their appearance : the next flower-bud in succession will soon be pushed forward as a substitute.

Soon as the general bloom is over, the collection must be removed to its summer repository. The plants should be examined as they pass through the hand on this occasion. Some, which have grown and flowered strongly, and whose roots appear above ground, may require to be shifted : dead leaves should be taken off, and the surface of each pot stirred and freshened up.

Respecting the summer station, it is only necessary to repeat, that the florist's daily attention does not cease with the flowering season. Many fine auriculas are lost from want of proper care during the summer. To obtain sufficient shade, the plants are often placed in some dark, out-of-the-way corner, where there is too much humi-

dity. The rich qualities of the compost in which they grow are peculiarly acted on by the summer heat ; and this, not having due ventilation, becomes corrupted, producing sickness among the plants often fatal. The fact is, they cannot have too much dry air during the summer, provided they are duly supplied with water. The constitution of the auricula requires pure air ; and therefore the summer stage or platform should receive all the advantage of free air, guarded only from the mid-day sun and from excessive rain.

That this plant is subject to disease, and that it frequently appears in the summer, are circumstances well known. Mr. Hogg attributes this malady to there being too much cow-dung used in the compost, and especially if the plants be kept in a low, moist situation : yet, though Maddock admits that improper soil may be the cause of the misfortune, he is rather of opinion that it is a consequence of the neglect of shifting after the flowering season ; adding, most unaccountably, that this malady seldom or never occurs in a wet or cool climate !

This disease is also said to be infectious; but, from its sweeping effects when and where it does happen, it is manifest that either the soil or situation is unfavourable. It is therefore good management, so soon as one appears to be affected, to shift the whole into fresh loamy compost, and give them a drier situation.

*Description of a fine auricula.*—"The stem should be strong, erect, and elastic, of a proper height, that the bunch or truss may be above the foliage of the plant. The footstalks of the florets should also be strong and elastic, and of a proportional length to the size and quantity of the pips, which should not be less than seven in number, that the bunch may be rather round, close, and compact.

"The parts of the floret are the tube, the eye, and the exterior circle, containing the ground colour, with its edge or margin: these three should be all well proportioned, which will be the case if the diameter of the floret be supposed to be divided into six parts; of which the dia-

meter of the eye will occupy three, the tube being one, and the ground colour the other parts.

“Florists agree that the florets should be round : but this seldom happens ; and we must be content if they are so nearly round as not to be what is termed starry.

“The anthers ought to be large, bold, and fill the tube well ; and the tube should terminate rather above the surface of the eye, like a little cup or margin ; the eye should be very white, smooth, and round, without any cracks, and distinct from the ground or self colour.

“The ground colour should be intense and rich, and equal on every side of the eye, whether it be in one uniform circular belt, or in bright patches ; it should be distinct at the eye, and only broken at the outer part into the edging ; a fine black, purple, or bright coffee colour contrasts best with the eye ; a rich blue or bright pink is pleasing ; but a glowing scarlet, or deep crimson, would be most desirable, if well edged with a bright green ; but this must seldom be expected.”

## PRIMULA VERIS.

### VARIOUS-COLOURED COWSLIP OR POLYANTHUS.

CLASS, PENTANDRIA. ORDER, MONOGYNIA.

NATURAL ORDER, PRIMULACEÆ.

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THE polyanthus, in the structure of its roots, tuber, stem, leaves, and mode of flowering, resembles its sister the auricula; and it is as much a production of art. Being naturally a native of moist woods and meadows, is much hardier, and better suited to the soil and climate of British gardens, than the auricula. It differs, moreover, in being a variety only, and not, like the other, a distinct species.

Its propagation, whether from seeds or offsets, and its cultivation, either as a bed or stage flower, is, in almost all respects, similar to the auricula.

The difference in the treatment only requires to be noticed.

The compost for the polyanthus does not require to be so rich as that for the auricula. The principal part should be fresh and rather sandy loam, mixed with moderate portions of leaf mould and well-rotted old hot-bed or cow-dung.

They may be flowered in pots for the purpose of being shewn, placed on a stage, in a conservatory or boudoir; but, soon as they have done flowering, they should be immediately turned out into a north or east open border. Their fibres being very attenuated are liable to be hurt by drought, and consequently require a more equable degree of both heat and moisture than they can receive in pots. But, if in pots, they should be kept plunged in the ground in a similar place; i. e. on a border having an east or north aspect.

They are commonly cultivated on such borders, because they succeed best. An east aspect seems most congenial to them: they delight in the early sun, whether of the year or of the day. If the natural soil of the border be unsuitable,

the top spit, to the depth of twelve inches, should be taken out, and in the bottom of the excavation should be laid a stratum of rotten cow-dung, two inches thick. This is not intended to be reached except by the extreme points of the fibres, should they descend so far, but to serve as a reservoir of moisture, and a source of gaseous vapour to give high colour to the flowers. This rich layer is to be covered with a compost (described above) to receive the plants; these being put in at equal distances of about eight inches apart.

In dry weather, they will require frequent watering, and especially if attacked by a species of acarus, commonly called red spider, which is very prejudicial to them. These little insects are not so easily driven from the polyanthus as they are from some other trees and plants, because they can secrete themselves in the under cavities of the leaves, to which water cannot be easily introduced. Two or three applications of tobacco water, thrown forcibly on with a garden syringe while the lower leaves are held up, is one means of ridding the plants of them; but this will

require to be repeated very often in dry weather. Slugs, snails, and earth-worms, should be banished with lime water.

The very choice sorts, when in flower, should have the shelter of a hand-glass, to preserve their beauty as long as possible. Except those intended to ripen their seed, all should have their flower stems cut away soon as the flowers have faded. Being prolific bearers of seed, its production receives a great portion of the strength of the plant ; consequently, the shoots and flowers for the next year are diminutive ; which would not be the case, if prevented from perfecting seed.

*Description of a fine polyanthus.*—“ Its properties are in most respects similar to those of a fine auricula, viz. the stem, pedicles, and formation of the truss ; therefore a definition of its florets and petals are only necessary to be considered in this place.

“ The tube of the corolla should be short, well filled with anthers, and terminate fluted, rather above the eye.

“ The eye should be round, of a bright clear yellow, and distinct from the ground colour : the proportion, as in the auricula, throughout the flower.

“ The ground colour is most admired when shaded with a light and dark rich crimson, resembling velvet, with one mark or stripe in the centre of each division of the corolla, bold and distinct from the edging down to the eye, where it should terminate in a fine point.

“ The florets should be large, quite flat, and as round as is consistent with their peculiar, beautiful figure, which is circular, excepting those small indentures between each division of the corolla.

“ The edging should resemble a bright gold lace, bold, clear, and well defined, and so nearly of the same colour as the eye and stripes, as scarcely to be distinguished.”—MADD.

There are many curious, improved varieties of the primrose ; such as the different-coloured double ones, which are well worth cultivation. Of species, a few have been lately added to

British collections, particularly a very shewy one, *Primula sinensis*, from China, which is at present a great favourite. As this is a pretty hardy, free-growing plant, there is no doubt that, by high cultivation in highly compounded soils, it may assume all the diversity of form and colour so remarkable in its congener of European origin.

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# DIANTHUS CARYOPHYLLUS.

## CLOVE CARNATION.

CLASS, DECANDRIA.

ORDER, DYGYNIA.

NATURAL ORDER, CARYOPHYLLÆ.

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As there is no plant more valued for its beauty and fine scent than the carnation, so no one has received more attention from the flower-gardener. In regard of this plant, cultivation has done wonders! When we consider the diminutive appearance of the wild clove, as it grows on the walls of Rochester castle in Kent, and on other its native places on the Continent, and compare it with its splendid offspring, such as *Fulbrook's Grenadier*, rising four or five feet high, we know not which to admire most; the triumphant per-

severance of the florist, or the astonishing versatility of vegetable power.

Much has been written on the culture of this universal favourite : and, so universally has it been cultivated in Europe, that the management has long ago been reduced into a code of practical rules. The rich spicy fragrance of the flower was, no doubt, originally an easy passport for it to a distinguished place in the parterre. There, it would naturally become, under ordinary treatment, more robust in habit ; its seedlings would soon partake of this luxuriance ; the flowers would next become exuberant ; hence would appear the rich-coloured and odorous clove. Continued cultivation, by change of soil and situation, would break its self-colour into lighter tints, and, by progressive grades of variation, become, what we now find it, the admirable carnation. It is said that the variegated clove first appeared in Italy ; but, though much cultivated there, as well as along the whole northern coast of the Mediterranean, it is certain the more indefatigable florists of France, Holland, and England, have chiefly

contributed to bring the flower, as well as its culture, to its present perfection.

The carnation is raised from seed, and propagated by cuttings and layers.

Raising from the seed affords the only chance of obtaining new varieties; and, though the chance of obtaining really good kinds is extremely precarious, yet it is the most interesting part of a florist's amusement. Much depends on choosing proper breeders, and procuring well-ripened seed. To secure this, some management is necessary in the treatment of the seed-bearing plants. These must receive every attention as to due watering, protection, &c. Such of the capsules as appear to be fecundified should be assisted by being divested of the decaying petals, by pulling them away with the tweezers\*, taking care not to injure the stigmas or pericarpium; by cutting off the reflexed extremities of the calyx with scissors, and also by slitting down the latter

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\* A piece of brass or copper wire, ten inches long, hammered flat at each end, and afterwards bent into the form of sugar-tongs.

to the bottom with a penknife. This trimming is to prevent moisture settling round the swelling capsule. The seed ripens about the end of September, and should not be gathered till it is of a dark brown or black colour. It should be kept in a dry place, and in the capsules, till after Christmas, when it may be rubbed out and put up in paper, or, in what Hr. Hogg thinks better, small well-corked phials.

The seed should be sown about the middle of April, in deep seedling pans or large pots, and covered lightly with finely sifted compost. If placed in a glazed frame or under a hand-glass, they will, if properly attended to, rise quickly and in more safety. When up and furnished with two or three pairs of leaves, inure them to the full air as soon as possible, to check them running up too spindling; and soon after this, they may be planted out in beds about ten inches apart, where they may remain to flower. The bed or beds should be prepared by deep digging, and enriched by a pretty liberal dressing of rotten dung and leaf mould; and no wider than can be

easily covered by hoops and mats when necessary either against extreme heat or severe frost.

Mr. Hogg estimates the chance of raising a first-rate flower from seed as only one in a hundred : of course, he means such only as might be entitled to a prize in a show. But this view aside, many new and truly beautiful varieties may be raised from seed, which, though not exactly formed and coloured according to the *beau ideal* of professional taste, may nevertheless be highly ornamental in the border, if not on the stage.

Propagation by cuttings, or, as they are called, pipings, is performed about the end of June or during the first fortnight of July. They should be chosen from plants having a redundance of shoots, or such shoots as are situated too high on the stem for layering. It has already been observed, that the shoots proper for this purpose are the secondary shoots of the plant, and which, if left attached, are destined to rise into flower the next or following years. But as these shoots would grow into irregular position, and likewise blow feebly and imperfectly, it is found much

better to remove the tops containing the embryo flower, and, by striking them, establish a new individual, convenient as to size, which being supported by a new set of active fibres, becomes vigorous in constitution. This is a concentration of the energies of the system, by which it is developed in greater amplitude in all its parts; and is also the sole and chief advantage of propagation by pipings and layers.

Pipings are easiest struck on a little artificial heat under bell or small hand-glasses. The size of the glasses determines the size of the pans or pots intended for the pipings. These are filled with proper compost, set in the bed, and the glasses fitted on to mark the boundary line within which the pipings are to be set: the next thing is to get and prepare the latter.

At the second joint from the top of the shoot, the cutting is to be separated horizontally, and just below the joint. The leaves embracing this joint must be carefully stripped off; and when the points of the leaves are also cut square off, the cutting is prepared. The mould in the pots

prepared for their reception should be previously watered; and, when somewhat settled, the pipings may be inserted, or gently stuck in, rather better than half an inch deep, and not too much crowded together. When the space within the glass is filled up, give water with a fine rose on the watering-pot, to settle the earth closely to the cuttings; and when this water is absorbed and evaporated off, cover them with the glasses; observing that, wherever they may be placed, whether in a hot or cold frame, or in a quiet corner in the open air, no full sun should have access to them, nor any unnecessary moisture be allowed to remain within the glass.

The reasons for thus preparing and planting the cuttings require some explanation. The tops of the shoots are chosen, because we find that, wherever the growth is most active (so as the parts are sufficiently organized and substantial to resist the decomposing effects of moisture), there the fibrous rootlets are soonest produced, and much more vigorously than from the lower parts of the shoot. They are cut just below the node

or joint, because these nodes contain several vital buds, which, like seeds, protrude fibres more promptly than the internodal parts. The tops of the leaves are cut off, because it is supposed that they draw a part of their nourishment from the stem, and therefore should be reduced while the cutting is forming its roots. Although this mutilation is directly opposed to the modern doctrine of botanical physiologists respecting the elaborating functions of the leaves, yet in this case the practice seems to be right ; because the points, if allowed to remain, very soon die. But whether their juices be abstracted by the exertion of the cutting, or fail from the supply of sap from the root being cut off, I shall leave to the practitioner to judge. Before the fibres are protruded from the bottom of the piping, a callosity is first formed, as if exuded from within the inner bark ; from this the fibres are produced ; and while this callosity continues to increase, the cutting lives, but, sometimes, will put forth no fibres till shifted into fresh compost.

Propagation by layers is more certain than that by cuttings, and is the most common method pursued, especially with the choicer sorts. The usual time is when the plants are in full flower, or immediately afterwards. Choose the shoots which are most conveniently placed for layering. Trim off all the leaves, except those at the extremity, which only require their ends shortened as is advised to be done with pipings. Then, clearing the surface of the pot or border, and stirring it up a little, lay on round the plant an addition of fine fresh compost of sufficient thickness to receive the layers. A bundle of little hooked sticks, about five inches long, should be previously got ready: those made from the stalks of fern will very well answer the purpose. A thin, keen penknife is most convenient for making the incisions. Lifting up the shoot with one hand, and bending it towards the stem of the plant, enter the knife about a quarter of an inch below the second joint from the top, sloping the edge inwards and upwards so as to divide the joint and shoot up the middle, nearly as far as the

joint above. The knife is withdrawn, and the small portion of the stem attached to and below the severed joint of the tongue is next cut off horizontally, close below, not into the joint. The bottom part of the layer is then to be fixed down close upon the surface by a hook placed just behind the incision; and the extremity raised rather upright, so that the tongue may be separated some little distance from that part of the stem whence it has been cut; propping the extremity secure by pressing the earth closely about it. It is almost needless to add, that the shoots, being brittle, and especially after the incision is made, they are easily broken; so that they require very gentle handling while fixing them in due position.

Many layers are lost, or prevented striking kindly, by being covered too deep. The end of the tongue, from whence the new roots chiefly proceed, should not be more than about half an inch beneath the surface. This circumstance should be particularly attended to in the treatment of carnation layers and cuttings, as well as

almost all other plants propagated by such means. A large portion of air, if it can be applied *without light*, seems necessary to excite the production of roots: thus cuttings, in immediate contact with the sides or bottom of striking pots, as well as near the surface, strike root more readily than if placed out of the reach or immediate action of the air. Precaution, however, is necessary, lest drought assail the delicate fibres so near its influence; to guard against which, moderate waterings and shading must be had recourse to.

In piping and layering carnations, there are several minor circumstances which should be mentioned in this place. Professional florists raise their pipings on a hot-bed, which, when of proper heat, is covered with suitable compost, on which the striking-glasses are set, and filled with pipings not too close together. Here they are nursed, and from hence they are potted off as soon as they advance in growth. This is a great advantage, because the growth of pipings is unequal; and according to their advancement should they be treated in respect of the supply

of air and water. The use of small striking-glasses is, that they contain a small portion only of air, entirely excluded from the frequent changes of the atmosphere; but this should be always kept as free as possible from damp, which can be done only by frequent and seasonable airings, on mornings or in mild weather.

Pipings should be labelled; because, if the plant from which they have been taken prove a run flower\*, its progeny will not be worth cultivation. If a considerable number remain stationary in the first bed, a second is made, to which they are transferred, and which seldom fails to start them. When all are in motion, the glasses may be laid aside.

The pots containing carnations intended to be layered should be well watered the day before; and, if exposed to the morning sun for an hour or two before layering, it will give the

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\* A run flower is one which runs from or loses that fine variety of colours for which it has been before admired, and by which it has been distinguished.

shoots a degree of toughness favourable to the operation.

While layers are in progress, the only attention they require is to see that they keep steady in their places; that they do not get too dry; nor the excised part become too much exposed to the air.

Should the weather, and all other circumstances prove favourable, the layers and cuttings will be sufficiently rooted to be potted in six or seven weeks. Pots, forty-eight to the cast, will be large enough to receive three cuttings or layers in each. These pots being drained and nearly filled with compost, the cuttings are carefully raised with a pointed stick or small iron spud, and placed at equal distances round the outside, covered in with compost, and well shaken or lightly pressed down securely in the pot, leaving the surface half an inch below the rim to receive waterings. The layers are cut from their stools just above where the incision was made, raised, and planted in pots in a similar manner. The young plants, after being duly watered, are

removed to a shady situation, where, however, they can receive all the advantages of free air, morning sun, regular watering, and defence from worms, insects, hares, and rabbits. Here they may remain to establish themselves in the pots, till the season renders their removal to their winter quarters necessary.

The winter repository proper for the carnation, is, in every respect, like that advised for the auricula. It should be designed so as to admit fully all the temperate influences of the weather, and yet be capable of being formed into a complete defence against extremes. Small collections are usually kept in common glazed hot-bed frames, set on a raised platform of coal-dust and ashes; the frame being raised on bricks to allow a current of air to pass freely among the pots in fine weather; and let down close to the ground when it is inclement or stormy. Sometimes the frame is filled nearly up to the glass with coal-dust, and the pots plunged therein. In either way, when coverings of mats may be added at pleasure, the carnation can never suffer

from the rigour of winter. During this dead season, they will require water occasionally, applied from the spout of a small pot, so as not to wet the leaves; because it may happen that if shut up when the leaves are wet, they may suffer by damp or mould. For the same reason the plants should be kept free from dead leaves, and have the surface of the pots now and then stirred up, and, if need be, covered with a sprinkling of sand.

About the middle of March, and especially if the weather be inviting, preparations should be made for shifting the plants into their flowering pots. Any time between this and before the tenth of April, is a good season. The ordinary sized pots for this purpose, are those called sixteens; and if the plants are strong, even twelves are not too large. These sizes are chosen in order that full room may be had for layering. The potting-board and compost (which will be described presently) being ready, first put the draining shells or shards over the hole in the bottom of the pot; cover these with a handful

or two of the rough nodules that do not pass the sieve or screen ; then fill up with the fine compost as far as is necessary to allow the reception of the plants. These, whether in pairs, threes, or fours, are turned out of the small pots, leaving the ball entire ; only taking away a little of the top and bottom ; place this in the middle of the large pot, very little deeper than it was before ; fill up round with the sifted compost, striking the pot several times on the ground or potting-board, to settle the contents equally and compactly ; giving water immediately.

At this time the number and kinds are selected for the stage (if so intended), together with a certain number of supernumeraries to supply blanks, should any occur. The remainder, if any, should be planted on a prepared border, to flower there. It is said that, if the stage plants were selected when first potted, and the surplus planted at once into a bed, they would stand the winter, with ordinary care, and flower better than if kept in pots till the spring. This, however, is always determined by the opinion or

convenience of the possessor. After being thus potted, they should be set in some convenient airy place, till they are sufficiently advanced to be set on the flowering stage. Some cultivators place them on this stage at once, and erect the awning over them when necessary.

During the ensuing period, the plants send forth their flower-stem; and, soon as they have risen so as to be in jeopardy of falling, or being broken by the wind, suitable propping-sticks are thrust perpendicularly into the centre of the pot, to which the stems, as they advance in height, must be neatly and securely tied. These sticks are four feet long, made of good deal, and formed like an arrow: the part which enters the earth is tapered off square, and the whole is painted of a lively green.

By and by the flower-buds appear. One, two, or three, only, of these are suffered to blow: all others, together with any side-shoots issuing from the stem, should be displaced soon as they come forth. If the aphides shew themselves, banish them as soon as possible by the means

herein-before mentioned; and be guarded against the attack of earwigs. Give plenty of water; and, if the foliage is not of a deep, luxuriant green, revive it with manured water.

Next follows the peculiar practice of the professional florist. Soon as the calyx, or pod, as it is technically called, begins to open at the top, fix a band of bass or waxed thread round its middle. this is to prevent the calyx bursting irregularly: and, as it naturally opens by its clefts parting from the top downwards, should one side incline to burst faster than the other, the cleft or clefts on the opposite side should be opened by the point of a penknife, to give freedom to the petals to expand themselves equally all round.

As some sorts and flowers expand before the generality of the collection, it is necessary to preserve these flowers till they are overtaken by the rest. For this purpose, funnel or rather umbrella shaped pasteboard shades are used, which, by a hole in the centre, are slipped on the flower-stick, and fixed just above the flowers.

Soon after this, all the best flowers will require additional assistance for the purpose of keeping the flowers in due form. This is called carding. Circular pieces of card-board, of any colour which will best answer the purpose of a background to the flower, are cut so as to surround the pod immediately behind the spreading petals of the corolla. They are about two inches and a half in diameter. The usual form of making them, is with a hole in the centre of the card, large enough to fit the pod, with a slit from that to the circumference, held open when put on. But an improved card is made by first dividing the circumference into six equal parts, and marked : between the opposite points or marks cuts are made through the centre, but not carried out to the circumference ; a margin, nearly an inch wide, being left entire all round, except at one place, to admit the stem. When this card is put on, the stem below the pod is first taken in, and, by raising the card to its place, the angular points, meeting at the centre, give way outwards,

and, being elastic, firmly embrace the lower part of the pod, which keeps it in place.

Besides this carding the flowers, which keeps the petals in due lateral position, another manipulation is bestowed in dressing a show-flower ; i. e. by arranging the petals themselves, pulling out bad-coloured or redundant ones, and placing all the rest in regular order. This branch of the knowledge of a real and thorough-bred florist, Mr. Hogg says, is a rare accomplishment, and exercised adroitly but by few.

The flowers, when full blown, are too heavy to be trusted to the sole support of their own slender peduncles. They should also be gracefully disposed to meet the eye of the spectator. For this purpose, small pieces of brass or copper wire, about three or four inches long, having a spiral crook at one end, to hold the stem, and sharp at the other, to be inserted into the stick, serve to secure the flowers in the desired position.

When the plants and flowers are all thus disposed, and in progress towards perfection (the

awning in the mean time being erected, and the paste-board caps or shades all removed), the owner has little to do but enjoy the fine spectacle ; mark the excellencies of some, and note down the defects of others ; observe the effects of any change made in the management ; try cross-impregnation between those whose properties of growth, form, or colour, he may wish to blend ; remembering, however, to keep such plants but as short a time as possible within the awning, as they should have full air and light as soon as it is likely they are fecundified.

Old plants, having several healthy shoots not wanted for either pipings or layers, may be kept through the winter, and either repotted with the rest or turned out into the flower borders in the spring.

Carnations continue in bloom about three weeks ; and, as they become rather enfeebled under the confinement of the awning, they should be restored to full air and light soon as their beauty is over, and the business of layering

begun, to go over again the course of culture which has been already traced.

The distinguishing characters of carnations in regard to each other, as applied by florists, are :

Bizarres\* ; scarlet, crimson, purple, and pink and purple.

Flakes ; scarlet, purple, rose, and pink.

“ Bizarres, or such as contain two colours upon a white ground, are esteemed rather preferable to flakes, which have but one, especially when their colours are remarkably rich and very regularly distributed. Scarlet, purple, and pink, are the three colours most predominant in the carnation : the two first are seldom to be met with in the same flower ; but the two last are very frequently. When the scarlet predominates, and is united with a paler colour, or, as it sometimes happens, with a very deep purple upon a white ground, it constitutes a scarlet bizarre, of which there are many shades and varieties, some richer and others paler

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\* Or Bizards.

in their colours, as is the case with all the rest. Pink bizarres, are so called when the pink colour abounds: Purple bizarres, when the purple abounds. Crimson bizarres consist of a deep purple and rich pink. When the pink flake is very high in colour, it is distinguished by the appellation of rose flake; but some there are so nearly in the medium betwixt a pink and scarlet, that it can scarcely be defined to which class they belong."—MADD.

*Compost.*—All our experience proves that the carnation requires a simpler combination of substances to flourish in than most other stage flowers. Fresh maiden loam, not too adhesive, rotten or old hot-bed dung, and sand, are the ingredients. The proportions are: three barrowfuls of loam; two ditto of rotten dung; and one ditto of drift, sea, or river sand.

These, put together in September, turned several times during the winter, and sifted or screened previous to the potting season, is all the preparation necessary.

This is nearly what Mr. Hogg recommends.

But, in November, he adds about half a barrowful of newly slacked lime, and early in the spring, two or three pounds of common salt. Both these substances are particularly useful to kill or drive worms and slugs from the compost; which is of most material consequence in the culture of a plant that is at all seasons the prey of snails and slugs. Whether these substances also add to the qualities of the soil necessary for the carnation, is not so certain; further than as they both are, in all other cases, absorbents, tending to keep the soil more moist, both in summer and winter, than it would otherwise be. To assist the vigorous expansion of the leaves and flowers of this plant, it has been recommended to water them occasionally with a weak solution of nitre.

For top-dressing in June, finely sifted rotten dung is most proper, as well in yielding nutriment conveyed down by each watering, as acting as a mulch in repelling drought.

For pipings and layers, the best mixture is: one barrowful of loam; one ditto of leaf-mould; one of rotten hot-bed dung; and one of fine sand.

“ High-coloured bizarres flower well in soil composed of two-thirds fresh sandy loam and one-third well-rotted stable-dung. Scarlet, rose, or purple flakes require equal parts of maiden loam and rotten dung.”—CORNFIELD, *in Gard. Mag.*

There are some varieties of carnations which are, more than others, liable “ to run” from their distinguishing colours, and thereby lose their value. All the varieties are subject to this deterioration at certain times, and under circumstances not easily accounted for. They occasionally lose their variegation, whether they are placed in rich or in poor soil. But, as the carnation has been brought from deep to lighter colours by cultivation, and as it is evident that deeper colours are imparted by the application of strong or rich animal substances, Mr. Hogg is perfectly right in advising to lower the quality of the compost to prevent this casualty. For this purpose he recommends “ three barrows of sound loam; one ditto rotten cow-dung; two ditto ditto horse-dung; half a ditto sand; and half a

ditto of lime rubbish or old plaster broken small, to be prepared and well mixed together."

Of this compost I have only to observe, that the cow-dung had better be left out; for, though it may improve the high colours of scarlet and crimson bizarres, it will be likely to cause some of them to go back to their original hue.

*Of the picotee.*—The picotee is another variety of the clove. It is hardier, and more easy of cultivation generally, than the carnation; and holds the middle station between this and the pink. It partakes of the nature of both; and it may not be a very irrational supposition, that it was originally a joint production between them; though, probably, the picotee was in existence before the carnation; and, if so, is more likely to have been "a sport" between the clove and the pink. Be this as it may, it is a very interesting variety of the genus, and though not allowed a place among carnations, lest it should deteriorate their forms and colours, it is still every way worthy to receive a share of their treatment, with which it will do well.

Of picotees there are many sorts, chiefly differing in their colour and various markings; viz. besides the common ones in every English garden, there are yellow and purple; yellow and dark red; yellow and scarlet, &c. They are much cultivated on the Continent, particularly those having a yellow ground colour: and such of them as have been introduced here appear to be more delicate in constitution than our common sorts, and require a drier atmosphere than our climate usually affords. Therefore they should have the driest place in the frame in winter, and never be too much watered. When they are more generally known and propagated in this country, their habits may become robust, and their cultivation better understood. Mr. Hogg advises them to be grown in compost like that made up for piping and layering carnations.

The common picotee being a flower of the greatest diversity of colours and variety of markings by accident, gives reason to imagine, that it would be particularly susceptible of impressions from the hand of the curious florist. It is worth a

trial : a new form of petals may be communicated from the carnation, and it may receive a yellow tinge from the yellow picotee ; and, however such crossing might interfere with the ready-made taste and fixed rules of the fancy, still a new description and variety of dianthus may be obtained, as worthy of admiration as the others.

Their cultivation is exactly like that of the carnation. They may be raised from seed, and propagated by layers and pipings ; succeeding by the latter mode rather better than the carnation.

It is desirable to procure seed from Italy and the southern parts of France and Spain. The dianthus tribe is universally cultivated in the latter kingdom, where they have innumerable varieties.

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# DIANTHUS HORTENSIS.

## COMMON PINK.

CLASS, DECANDRIA.      ORDER, DIGYNIA.

NATURAL ORDER, CARYOPHYLLÆ.

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THE pink is cultivated every where, often being the principal ornament of the cottage garden. Its manner of growth, flowering, cultivation, and propagation, are all similar to the carnation.

For the purpose of forcing, for sale, or for placing in conservatories, green or dwelling houses, they are kept in pots; but for flowering in perfection they are planted on prepared beds in the open ground.

Although pinks may be propagated by layers, it is seldom such care is bestowed; they striking so readily by pipings.

The beds should be prepared in September, much in the same way as is directed for the carnation. The surface should be raised two or three inches above the natural level of the ground, and laid rounding, or highest along the middle, to throw off immoderate wet. The plants should be put in about nine inches apart; and, in order to have them strong, they should be piped as early in the season as possible, and soon as sufficiently rooted should be transferred to a nursery bed, to gain strength before they are put out for good.

They may require occasional defence in rigid weather, by hoops and mats; and after being hoed among in the spring, and the soil made firm round their stems if necessary, receive a covering of sifted rotten dung, about an inch thick. This will be a source of nutriment to the plants, and prevent the bed becoming too dry. When they throw up the flower stems, these should be reduced in number according to the size of the plant. The fewer there are allowed to stand, the stronger will be those that are left.

They have received their generic name from the circumstance of their fine scent, and magnificence of their numerous flowers. These should be reduced: one, or at most two, besides the central flower, is enough. The flower-pods should be assisted to open regularly, by girding, &c. as practised with carnations; as well as carding, tying up, shading, and always well supplied with water.

The pink is easily susceptible of cross impregnation, and many new varieties are obtained by such means. M. Fries-Morel, a French florist, advises it to be done in the following manner:—  
“Just before sunrise, open carefully the flower to be operated on, and abstract the anthers with small pincers. About eight or nine o'clock place the ripe pollen upon the stigma of the flower, and repeat this two or three times in the course of the same day. If the act of impregnation has taken place, the flower will fade in twenty-four or thirty-six hours; but if not, the flower will remain in full beauty; in which case the attempt

must be repeated. This should always be done in fine serene weather, and care should be taken to defend the impregnated flower from rain and mists.”—*Annales de la Soc. Hort. Paris.*

The cultivation and improvement of this highly and universally esteemed flower has been greatly extended within these last few years, and the new varieties are wonderfully fine; some of them even vying with the carnation: still there is room for further improvement.

*Description of a fine double pink.*—“The stem should be strong, elastic, and erect, and not less than twelve inches high. The calyx rather smaller and shorter, but nearly similar in form and proportion to that of a carnation; the flower should be also similar in form, and not less than two and a half inches diameter.

“The petals should be large, broad, and substantial, and have very fine fringed or serrated edges, free from large, coarse, deep notches or indentures; in short, they approach nearest to perfection when the fringe or the edge is so fine

as scarcely to be discernible: but it would be considered a very desirable object to obtain them perfectly rose-leaved, i. e. without any fringe at all.

“The broadest part of the petals should be perfectly white and distinct from the eye, unless it be ornamented by a continuation of the colour of the eye round it, when it would be called a laced pink; and this lacing should be well defined, leaving a considerable proportion of white in the centre, perfectly free from any tinge or spot.

“The eye should consist of a bright or dark rich crimson or purple, resembling velvet; but the nearer it approaches to black, the more it is esteemed; its proportion should be about equal to that of the white, that it may neither appear too large or too small.”—MADD.

Although specific directions have been given for the cultivation and treatment of the several kinds of flowering plants herein-before mentioned; each being described as coming into

bloom at the natural season; yet it must be observed, that the business of a florist is, not only to have flowers in season, but out of season also. By choosing the time of planting, many kinds may be made to flower at other seasons than they would do if left to nature. The florist should therefore avail himself of every such practical expedient, in order that his beds and borders may always present something pleasing to the eye. Many flowering plants which would be destroyed by the first frost, may, if placed in pots, be removed to a place of safety; or, if not in pots, preserved by a slight covering. Early flowers may be forwarded by having a winter's protection; and especially by a little spring forcing. All biennial flowers, as stocks and wallflowers; and perennials, as cyclamens, &c., may be advanced into bloom at an acceptable season, as well as many other annuals and perennials that are ornamental. The florist should never be bound by the naked rules laid down in this or any other book; but think for himself how he

may best accommodate the public—his employer—or his own fancy. Nature, though she cannot be violently thwarted, may be led to answer many purposes of skilful art.

The foregoing are the bed and stage flowers commonly cultivated in Britain. It is surprising with what ardour this art is followed, not only among professional men, whose interest is a sufficiently powerful incentive, but by those of very different avocations who have nothing but the pure love of flowers to induce, and intense enthusiasm to excite them to cultivate those gems of vegetation for their own gratification. This species of amusement may be undervalued by the utilitarian, as a vain employment; but nothing can be called useless which so mainly administers to innocent, mental, and social enjoyment.

As these pages are written entirely with a view to assist and encourage this rational pursuit, and as the foregoing are not the only flowers which deserve a place in the villager's or cottager's garden, it will not be superfluous to add a list of

hardy herbaceous flowers which are as admirable in themselves, as they are easy of cultivation. See list No. 1, of the Appendix.

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EXOTIC FLOWERS AND PLANTS.

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IN order to make this little work of more general utility, it is deemed expedient to add somewhat on the subject of tender exotic flowers. Many who are engaged in the cultivation of bed and stage flowers have, or may have collections of exotics also, in hot-houses, green-houses, or conservatories; to whom the following observations may not be wholly useless or unacceptable.

*Of the hot-house and its plants.* Hot-houses are glazed structures for the preservation of tropical exotics. They are designed for the cultivation of fruit, particularly the pine-apple; and likewise for plants that are either curious in form or remarkable for the beauty of their foliage, or splendour of their flowers. To imitate the native climate of tropical plants, a high degree of heat from fire, steam, or hot-water flues, must be

maintained at all seasons, when required. Not only the air of the house must be kept at the temperature of not less than 60°, and with power to increase it, but the pit containing the pots must be filled with tanner's bark, or some other fomenting substance, to produce a strongly exciting bottom heat. By this artificial climate many plants are preserved, flowered, and fruited in great perfection.

It has been questioned how far the custom of using fermenting substances for the roots of tropical plants is right or necessary. Comparing the heat of their native soil with that which we give them here, is one way of ascertaining the requisite degree; but in this point we do not imitate nature exactly; because, in no situation within the tropics, except perhaps the barren African sands, is the soil (where there is any moisture at all) ever so warm as the bark bed of a hot-house; and, therefore, it may appear that we are at unnecessary pains and expense in giving such bottom heat. That we are so with plants which we only wish to keep in existence,

or only to flower once in the year, there can be no doubt; because the heat in the air of the house will be sufficiently imparted to the soil in it. And though this custom may have been only accidentally adopted from what was found necessary for pines, yet it need not be persisted in, except for those or other fruits. Even its necessity for fruits has been doubted; but such doubts are injudicious, because, in the case of fruit, we must not only provide the necessary temperature for their existence, but must also *force* them to yield their fruit in the shortest time possible, to save expense and trouble. This, therefore, should be the rule, that with pines, mangoes, annonas, bananas, mangosteens, &c. the roots require to be excited by heat as much as, and perhaps even more than, the flowers and foliage; but for the other common inmates of a hot-house, they do very well without, especially if the heat of steam or hot water be provided.

Collections of hot-house plants are first formed by purchases from commercial houses, or from seeds or plants imported from their native places

abroad, and are afterwards kept up by methods of propagation, about to be adverted to.

When seeds are received from abroad, it is of considerable importance to know, not only what latitude they come from, but also the elevation of their natural habitat above the level of the sea. The higher the elevation, the hardier is the plant. Many plants which may be supposed to require a hot-house, from the latitude whence they come, may be found hardy enough for the green-house, or even the open air, if they be seasonal\* plants. But for the natives of low lands of the torrid zone, the usual process of raising them is as follows :

If possible, they should be sowed so as to meet our summer, not our winter. The spring months are most propitious for raising exotics. For this purpose, light sandy loam, convenient sized perfectly clean pots (open thirty-twos), and a one-light hot-bed, should be prepared.

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\* Seasonal plants are such as grow in one season and rest in another.

The pots are filled in the ordinary way, the finest of the loam at top; the seeds are sown thin, or thickly, according to their size, and in depth according to the nature of the plant. Some vegetate sooner, by being soaked two or three hours in water; others having very hard shells, as *Nelumbium* and other aquatics, should have the points of their shells filed off before they are put into their pans of mud and water; but the generality need no such preparation. They require a smart bottom heat to start them; some will be up in the course of a week, others will remain for twelve months before they vegetate; and such should not be rashly thrown away, till it is ascertained by examination that they are really dead. This precaution is particularly necessary in regard of nuts.

When any are advanced so far as to be fit to handle, they should be put singly into the smallest sized pots, and again plunged in heat. Attention should be given not to over-pot them, i. e. by placing them in over-large pots. It has been already observed, in speaking of layers and cut-

tings of hardy plants, that the point most favourable to the formation and production of roots is but at a little distance below the surface; and that humid darkness within the influence of air excites the protrusion of roots more readily than at depths beyond the influence of that element. Small pots, therefore, to which air has free access on all sides, are found to forward the plants they contain much better than large pots, which, containing a mass impervious to air, the centre of which is occupied by the infant plant, are found to retard rather than advance their growth. That plants so placed require frequent shifting, is true; but this is all in their favour, if quick growth be desirable.

After this period of their nursing, they then take their places in the hot-house, either plunged in the bark-bed, or set on the shelves over the flues, or on the kirb of the pit.

Hot-house plants are also propagated by cuttings. Much judgment is necessary in selecting such shoots as are proper. They should be shoots or parts of shoots of the present year; either of

the leading shoots, which make the handsomest plants (if not too rampant and succulent for the purpose), or from the lateral shoots, which are often best fitted by moderate growth for striking. These last, too, make more bushy heads, and flower sooner than free-growing cuttings taken from more vigorous parts of a plant. The tops of the shoots should be chosen, if sufficiently ripened; but a well chosen part of the middle may succeed equally well. Prepare them by cutting the lower end transversely, close below a joint, if it be a jointed stemmed plant, or just below the insertion of a leaf, if otherwise; trimming off the lower leaves close, but leaving those at the top. The cutting should not be long; two inches is enough of any hard-wooded plant. The same kind should be put in the same pot; open forties are a convenient size. When filled, the soil should be pressed in pretty tight, and the cuttings inserted nearly an inch deep with a small pointed dibber, by which the earth is pressed close to the bottom of the cutting. When the pot is filled, level and press the surface smooth,

give water immediately, plunge the pots in the bed, and, when the moisture is exhaled from their surfaces, cover them closely with the striking-glasses, to prevent the entrance of air. These glasses are necessary, because neither the cuttings nor the soil they are in should be exposed to the ordinary changes of the atmosphere. They require perfect repose while they are only dependent on their own inherent energies to furnish new organs to supply the place of those from which they have been separated. The sun's heat may be serviceable, but not his direct rays; brown paper shades should therefore be used for each glass in the middle of the day. Moisture will collect from time to time within the glasses; in which cases they should be taken off for a few minutes, wiped dry, and put on again.

When cuttings thus managed have taken root, and shew by their growth that this has sufficiently taken place (for some will occasionally produce shoots before they have roots), they may be separated, potted, and treated as already directed for seedlings.

A late writer in the periodical publications of the *Société d'Agronomie* of France reports, that he strikes cuttings of stove plants, which have very small or no visible buds, much more easily in phials of water sunk in the bark-bed than in mould. In this way he readily succeeds with Oleander, Portlandia, and Blakea.

These are the ordinary methods of propagating both hot-house and green-house plants by seeds and cuttings that are of a woody nature, as well as suffruticose; i. e. half shrubby sorts. Many are increased by suckers which rise from their roots, or by offsets which proceed from the collet of their stems. All the succulent tribe, as Aloes, Messembryanthemums, Cactus, &c. are propagated by offsets or portions of their stems. Some few grow from leaves, as Bryophyllum, Xylophylla; others by a leaf and bud only, as Hoya, &c. Tuberous or fibrous-rooted plants which are herbaceous, are increased by parting the roots; and bulbs which do not readily produce offsets may be made to do so by cutting off

the upper part of the bulb transversely, as has been already mentioned.

Such sorts as do not readily strike from cuttings are increased by layering, grafting, or budding. Layers are the points of the shoots, inserted into pots filled with loam, and placed conveniently to receive them; and, when layered in the usual way (that is, by tonguing or twisting a little the part placed in the soil, and there fixed), are covered with a striking-glass till they make roots, when they may be separated from the parent plants.

Grafting stove plants is commonly done by "approach." The stocks are raised in pots, for the convenience of placing them near to the shoots with which they are to be enarched. The stock and scion should be nearly of a size: and, at the most convenient point of contact, similar slices of bark and wood are cut from the opposing sides; these, placed neatly together, are bound and clayed. The clay should be kept moist, which is easily done by bending a wrap of moss round it, and now and then watered.

A new method of grafting by approach has been lately practised, and which deserves notice. The inconvenience of placing or supporting the stocks round the tree intended to be propagated, and the fact, that this mode of grafting is successful only because the scion continues to receive from its parent a part of its support while uniting itself with the stock, suggested the idea that, if the scion received a supply by other means, the junction would as readily take place. Accordingly, a scion is separated entirely, and united by its middle to the stock in the manner of grafting by approach, and its end below the junction is inserted into a small phial of water suspended from the stock. Thus the scion receives from the water what, in the old way, it received from its parent. So readily does the union take place, that it sometimes happens (in the case of *Camelias* particularly) that the lower part of the scion appears to partake so far of the vigour of the stock, that it also forms roots in the phial, and when separated and potted, becomes a plant itself. There is no doubt, but that many hard-wooded

plants, both in the hot-house and elsewhere, may be propagated in this manner.

Working exotic plants, whether by graft or bud, has not been practised in this country so much perhaps as it should be ; not, however, for the object of increasing the kinds, but for another purpose, viz. predisposing the plants to yield their flowers, or fruit, earlier than they otherwise do. The effect of working plants is well known. A grafted or budded tree is rendered less vigorous in habit, and consequently sooner arrives at that stage of its existence in which it shews flowers and fruit. A graft, attached to a suitable and congenial stock, has no period of youth to go through. The scion is or may be taken from the already matured branches. It is doing in the vegetable world what is seldom practicable in the moral ; viz. “ putting an old head on young shoulders.” This we invariably do with our fruits ; and why may it not be done with our flowering plants ? A seedling *Camellia*, for instance, will not flower in less than three or four, whereas a graft will flower in one or two

years. If our hot-house trees were dwarfed by the same means, that is, by transferring the topmost shoots to the bottom of the stem, it would not only keep the plant in a more convenient size, but bring them sooner into flower and fruit. The splendid *Bombax ceiba*, *Allemanda cathartica*, *Barringtonia indica*, *Æschynomene grandiflora*, &c. &c. are plants well worthy such trial. With hot-house fruits, such as the Mango, this treatment would certainly be a great improvement; and of this fine fruit it should be known, that there are many varieties of it differing materially in their quality; some are inferior because of the stringiness of their pulp, whilst others are as free from that defect as are our best melting peaches; such only should be imported for cultivation. The *Garcinia mangostana*, one of the most delicious tropical fruits, has been fruited in France. I mention this as a proof that our present expensive old-fashioned stoves may be productive of something else besides mere showy plants.

The ordinary attention to a hot-house, is, as

siduity in keeping up the stock by propagation ; a careful nicety in potting and shifting in the proper season ; a regularity in watering when requisite ; a knowledge of the necessary temperature to be kept in the house, and a steady attention to cleanliness, and habits of the plants in general.

The collection should undergo a thorough examination about the middle of April. At this time the plants are shifted into new and somewhat larger pots, if necessary ; at least, they are turned out of their old pots, part of the exhausted soil taken away, decayed roots cut off, and then are replaced in fresh pots and compost. The heads are also pruned into form, and neatly tied up to stakes. While the plants are under this treatment, they should be guarded against cold winds while the old bark is sifted, new added, and all well mixed. The bark, when finished, should be about six inches above the kirb, and levelled to allow the plants to be set upon it till the fresh fermentation raised in the

bed has subsided, when the plants may be, at first, half plunged; and, when the heat is still further decreased, let in as deep as their rims. Some very successful cultivators never plunge the pots, but merely set them on the bed.

When a plant is turned out of a pot, the roots are found in a matted state round the outside; the usual practice is to cut these away with a knife; but it is only very free growing sorts that can bear such treatment; a better way is, to loosen this tissue of fibres gently, so that the new soil may get among and preserve them for immediate service.

After the plants are shifted, and again set in their places in the pit, the house should be kept rather close, moist, and at a temperature of not less than 60° Fahrenheit. The management, afterwards, consists only in duly watering, giving air, &c. till Midsummer, when fire heat is discontinued; the pots (if plunged) are lifted out of the bark and set on the surface for a few days previous to removing them (if the summer weather be confirmed) into the green-house for a few

weeks. The tenderest, most valuable, or sickly among them, however, must not be so exposed, but re-plunged in some other bed suitable for them. Those placed in the green-house should have full air in the middle of the day, but shut up on nights. In September the bark-pit in the stove must be again got ready for the plants, by adding fresh bark, white-washing and cleaning the walls and flues of the house, &c., and soon as this is all done, the plants may be brought back to their place, but not immediately plunged till the state of the bed is fit for them. About the middle of October fire heat is again applied; the state of the weather regulates this, as well as giving air, watering, &c., and, as the winter sets in, neither much air nor water will be required; at least, considerable caution must be bestowed in applying these elements. About Christmas the bark-bed will require another addition of fresh bark, turning, &c. In doing this, the utmost expedition must be used to get the plants replaced, especially if the season be severe. Should the fresh heat, thus obtained, fail before

the general potting time, the bark must be again turned, to keep up the necessary temperature.

Hot-house plants are very liable to be preyed on and disfigured by insects, especially the red acarus (not spider, as it is erroneously called), the different species of coccus, as well as the universal plague, the aphid. The dry heat of a stove is peculiarly favourable to these insects, and, unless the house is heated by, and frequently saturated with steam, the plants rarely look healthy. But this is not suitable for all; succulent plants, which are natives of hot rocky countries, need but little water, and, consequently, require dry air. It is evident, therefore, that a collection of tropical plants cannot all be cultivated properly in the same house.

Hot-houses in the conservatory style are by far the most interesting, and may be the most magnificent of our horticultural buildings. Many plants of the torrid zone are nothing while confined to a pot or tub, however large. But when planted in prepared ground, and covered with a sufficiently lofty glazed roof, the plants, and

especially the towering palms, plantains, &c. have space to throw out their ample and persisting foliage. Every plant in such a place appears in something like its natural character; and, though the want of such buildings has been long regretted, it is only lately that such houses have been erected. Some splendid things of the kind have been executed, and others are in progress. Circumstances favourable to such designs have conspired to facilitate such undertakings; better taste, curvilinear iron roofs, and much improved means of obtaining the necessary degree of heat, have all tended to realize what has only heretofore been a gardener's dream.

This is not the place to enlarge on what may be done in this way. But, certainly, one handsome building as a conservatory, divided by glazed partitions, to contain a choice selection of tender plants from every clime, would be far preferable to the miserable shed-like buildings which now disfigure almost every garden in Britain. It only requires a proper distribution of heat to

imitate every climate, and to suit the nature of every plant on the face of the earth. Gradations of temperature may be obtained, and decreasing on each side from the central and lofty equatorial stove, through all the degrees of the temperate zones, befitting the vegetable beauties of every degree of longitude as well as latitude. The south European, African, Asiatic, and American fruits and flowers, may all be exhibited in one suitable and highly ornamental range. Nor need such disposition encroach on the general collector's aim; sufficient space for stages, shelves, and platforms would be had for the disposal of potted plants; and, besides the whole being so connected, would very much reduce the first cost of erection, as well as lessen the subsequent expense of keeping up.

If, with such comprehensive view, we contemplate what may be accomplished in the construction of forcing-houses for fruits also, the practical gardener or designer must be blind who cannot perceive the incalculable advantages that may be derived from a judicious arrange-

ment of such buildings. Not only the pineapple, but all other tropical fruits worth cultivation, might be had for the tables of the opulent, and those already in cultivation might be had at much less expense. As this subject is, however, foreign to the purpose of this compendium, it need not be noticed further.

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## THE GREEN-HOUSE.

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A GREEN-HOUSE is, perhaps, one of our oldest horticultural buildings. They, it is probable, were first erected for the purpose of keeping exotic evergreen plants, particularly Oranges and Myrtles. Wherever Italian or Grecian architecture was introduced, the sweetest Italian plants were a necessary accompaniment. Hence arose those heavy buildings usually attached as a wing to palaces; which, though capacious enough for very large trees, were by no means suitable either for the protection or health of them.

The increasing love of botany, together with the constantly increasing numbers of curious exotics introduced to our gardens, called for lighter and better glazed structures for their reception and preservation; and, consequently, green-houses have been progressively improv-

ing in design and extent, even up to this day. They usually contain all the hardiest plants of the torrid zone, Chinese, Australian, south African, and the tender plants of North and South America.

Green-house plants are raised from seed, and most easily propagated by cuttings and layers, much in the same way as has been directed for stove plants; only they do not require, in any stage of their existence, so much heat. The degree called temperate,  $56^{\circ}$  Fahrenheit, is most suitable for them in all seasons. Grafting is also a means of propagation, and is decidedly the best for such plants as the Camellia, Orange, &c.

Various kinds of soil and compost are necessary in the cultivation; sandy loam, rich loam, moor-earth, more or less mixed with sand, leaf-mould and lime, or rather old mortar rubbish. Except Oranges, Lemons, and Citrons, no other plant in this department requires a manured soil. The grand object is to keep them in the highest health, without forcing them into over luxuriant growth. When a green-house shrub, or tree,

arrives at a flowering state, and is of a handsome form, is all that is requisite. Rambling, irregular growths become extremely inconvenient in such collections, and can only be kept in order by the knife, or turned out altogether.

Seeds of the generality of green-house plants, whether saved at home, or received from abroad, should be sown in fine, light, sandy loam, about the beginning of February. They thus have the advantage of the approaching spring and summer to arrive at such a size as will allow of them being potted separately before the autumn. Free growing sorts may be sown later. The pots should be thoroughly watered soon as the seeds are sown, and ever after kept in a moderately damp state, and placed in a hot-bed, or in a dry, airy part of the house, where they will not be too much exposed to heat, either of fire or sun, but enjoy an equal temperature.

Diminutive or wiry growing plants, such as heaths, are best sowed in autumn; because, their progress being at first very slow, they require to remain in the seed-pots nearly twelve months

before they can be potted out singly. Seeds of curious or valuable sorts should not be sowed all at once : a first sowing may fail, whereas a second may succeed. If, when the seedlings are rising, there should be much sunshine, they should be shaded in the middle of the day, lest they get parched. No weeds should be allowed to rise among them ; nor should the surface be covered with moss if it can be prevented ; though if it rises with the seeds, which is very frequently the case, it cannot then be taken away.

Soon as the green-house becomes too dry a station for them (which it certainly will be about the end of May), the seed-pots should be removed to some shady border, and plunged up to their rims in sand, or coal-dust. This will keep the mould in the pots in equal temperament as to moisture ; and being free from the excitement of the sun, and receiving full air, occasional watering and protection from worms and insects, the plants will get hardy, stocky in growth, and soon fit to be transferred to small pots. When a spare frame, or part of a glass-covered pit can be had

for the reception of the seedlings in this stage of their growth, it should be preferred; because they can not only be shaded when necessary, but also defended from heavy rain, which is sometimes hurtful.

As the seedlings get large enough for potting, the different kinds of soil and compost should be previously prepared for the purpose. There should be two sorts of fresh maiden loam: one in its natural state, and another of a lighter description, or mixed with sand. Pure moor-earth also of two sorts; that is, more or less mixed with sand: which different qualities must be used as respectively suitable for the different kinds of plants to be potted.

It is impossible, and unnecessary, perhaps, to imitate the native soils of every plant admitted into a green-house collection. The groups only which chance to be geographically or locally classed need be noticed. For instance, all the African heaths, as well as those of the same family from all parts of the world, together with south African shrubs in general, succeed best in sandy

moor-earth. Australian or Botany-Bay plants grow well in the same with a little addition of loam. Chinese productions affect light hazel loam ; as do also the natives of South America. As a general rule, the character of the roots indicates pretty clearly what description of soil is proper for them :—if they consist of very slender and much divided fibres, a fine vegetable porous soil is necessary ; but if the roots are simple, strong, and widely spread, a more tenacious one is requisite.

Succulent plants, as Cactus, &c. require an open porous soil, composed of light loam, and old mortar rubbish in equal parts, mixed. Orange, lemons, &c. thrive best in fresh loam, enriched by old stable, cow-house, or sheep-cot dung, well comminuted and incorporated. Green-house bulbs, as *Agapanthus*, do well in light loam.

Propagation by cuttings is performed much in the same way as has been described for stove plants. There are, however, a few peculiar usages which may just be stated. As it is of importance to begin early in the season, the

business may commence soon as proper cuttings can be obtained. Such plants as are stationary in growth, but desirable to be propagated, are sometimes placed in a hot-house or frame to force the production of young shoots; for unless young wood of proper age is procured, there is much less chance of success. The greater number of plants in such collections are commonly propagated from the spring shoots; and many of them, as geraniums, are propagated by any part of their branches or roots.

The mode of striking heaths from cuttings is rather peculiar, and therefore deserves particular notice. The pots should be well drained and filled with sandy moor-earth to within an inch of the rim. This should be pressed pretty tight, so as not to sink afterwards; and covered nearly to the top of the rim with pure white sand, also pressed tight. The pot should then receive a good soaking of water, to prepare it for the reception of the cuttings.

The cuttings should be selected from moderate-sized shoots of the same year's growth. About

one inch in length of the tender top is enough ; the leaves are cut, not stripped, from the bottom part more than half way up, taking care not to wound the epidermis ; and the base is cut smoothly and transversely off, as the nib of a pen is cut upon the thumb-nail. When the quantity sufficient for one pot is prepared, let them be immediately inserted by the dibber, and watered, to settle the sand closely round them ; after standing till the surface is somewhat dry, the striking-glass must be put on and pressed tightly down to exclude the air.

A bed of saw-dust should be formed in some convenient spot in which to plunge the pots ; and if within a frame, so much the better. They should be kept shaded from the mid-day sun ; and if the mould in the pots gets at any time too dry, water may be given, so as not to wet the tops of the cuttings : the glasses should be kept dry by wiping them as often as is necessary.

The month of June is the best season for striking heaths, as by this time the young shoots are in good order. Cuttings that were put in early in

the season, may, by this time too, be fit for potting; and such of these as are not advanced enough, may be brought and placed along with the new pots of cuttings, in order that they may all share the same treatment and superintendence.

As the cuttings advance in growth, they must be gradually treated with a larger share of air, light, and water, till they are all ready to be parted and placed in the small sized thimble pots; after which they should receive a little more nursing, till they have fairly taken possession of their new station, and then they go to their destined place in the collection.

It is hardly necessary to give directions for potting off the cuttings after they have struck root. Care in separating them from each other, and preserving to each its own roots as entire as possible, is the chief affair; and minding to seat them carefully, and not too low in the centre of the pots.

Many of the strong-growing, spongy kinds of green-house plants may be readily struck without

glasses, as confined air is apt to rot them. And there are some plants, as Camellias for instance, which not only require no glasses, but cannot be safely struck till the young shoots are done growing, nor until every leaf is perfect; because, during their expansion, they are extremely succulent, and easily destroyed by either moist air or sunshine. But as the seeds of this fine plant frequently ripen in this country, a store of young ones may be more readily obtained from them, either for new varieties or for stocks, than by the old means of layering or cuttings.

The cultivation of orange trees has become an object of much interest of late, and the propagation of them has been greatly improved. The best stocks for grafting on are raised from the seeds of lemons or citrons. Lemon seeds sowed in January and raised in a dung or leaf hot-bed, and nursed, frequently shifted, and well managed throughout the summer, may be grafted in the autumn, or, at farthest, in January following. When grafted, they are kept in the same, or placed in a new lively bed, to assist the union of

the graft and stock, and accelerate the growth, which, under such management, is astonishingly rapid. By this means a quantity of beautiful young orange trees may be soon obtained. But a still more expeditious method than this is described by an intelligent writer in the *Gardener's Magazine*, vol. iii. p. 272. He states, from actual practice, that cuttings of the Madras citron, put into pots in January, will strike and be fit to receive a graft in the following April; and if a graft be chosen which shows flower-buds, these will be fully blown in six months from the time of putting in the cutting! One thing respecting the cuttings, noticed by this same writer, which has often before been regarded by former cultivators,—is, to put the bottoms or lower end of the cuttings in contact with the sides of the pot, or down so as to bear on the shards in the bottom of it. This position, it seems, hastens the production of roots, there being additional excitement from the extra heat retained by the solid substances of the pot and shards.

From these facts, it appears that the citrus

family is a very manageable tribe; and whether the various sorts of it be regarded as fruit, or only as ornamental plants, they are, though no novelty, well worthy of every care and expense bestowed upon them. An orangery, properly designed and conducted, is in all seasons an interesting spectacle, and fully deserves a division in every range of horticultural buildings.

Green-house bulbs and other plants which do not produce stems are increased by parting the roots.

Having noticed the different methods of propagation, I shall now briefly state the general management of such collections.

In respect of the building, it should be sufficiently large for the collection intended to be kept in it; or rather the collection should be limited to the size of the house. The whole may be injured by an endeavour to keep a great number. The exterior of the building may be ornamental; should stand dry, and rather elevated; capable of admitting the greatest share of air and light; and the means of heating it so complete,

that no degree of cold should ever jeopardize the safety or health of the plants. These particulars are essentially necessary for the well-being of green-house plants, kept, as they always are, in pots, and ranged on a graduated stage of shelves sloping from the back to the front ; or, if the house be glazed all round, on a stage sloping both ways from the centre. Or, instead of a stage of shelves, a platform three feet from the floor occupies the middle of the house, on which the plants are placed according to their height, each being easily seen from the path which surrounds the whole. Between the path and the outside walls, grated shelves are placed, usually over the flues, to serve as benches on which to set the smallest plants, or pots of forced flowers. Except orange trees, or very tall plants, none are placed on the floor ; it is an advantage to the plants to be near the glass, so as they are not too much above the eye of the spectator.

The fire-place is usually in a shed behind the house, the shed being a useful appendage for many purposes connected with the management

of the plants. The general temperature should never be lower than  $40^{\circ}$ , nor higher than  $60^{\circ}$ , while the plants are in the house. Dry, mild, fresh air should be admitted at all times, if not below the minimum above-mentioned. Fire should never be used but to repel frost, or to dry the house and plants, when a current of air can be at the same time admitted. Watering, clearing from dead leaves and insects, stopping over-luxuriant shoots, and perfect cleanliness, is all the attention required in the green-house during the winter months.

As the spring advances, a greater share of fresh air is daily given from morning till night; and, in very mild calm weather, the sliding sashes in front may be kept open on nights as well as days, especially towards the end of April and beginning of May, to prepare the plants for being taken out of the house altogether. The variable-ness of our seasons prevents naming any particular time or day when this business should be done. The old rule among British gardeners is when the common *mulberry* puts forth its leaves. This is an

excellent because a perfectly safe indication of the progress of the season. Previous to this time, therefore, every preparation should be made for this necessary work: the different descriptions of soil and compost, pots, prop-sticks, &c. should all be in readiness; as well as the place where the plants are to stand for the summer.

It is material that the shifting, which is a scene of disorder, should be got speedily out of hand. The usual practice is to shift the plants as they are taken out of the house, and when done, watered, pruned, and tied up, are carried to their summer station. That station should be a sheltered, rather than a shady spot; an east or north aspect is most suitable; and if where they can be seen, or be ornamental, the better. When the house is cleared of the plants, it should receive a thorough cleaning; the grape vines, if there be any trained to the rafters, dressed and tied up; and the vacant shelves again furnished with hot-house plants, tender annual and other showy flowers, raised and now ready for the purpose.

While the plants are in their summer station,

they only require the ordinary care of frequent watering, picking, and keeping in due position against wind. They should be set on reversed pans, tiles, or on some compact level surface, formed of lime and coal ashes, to prevent earth-worms entering the pots. And if, as is often the case, they are set on sand, gravel, or on the common soil, the roots speedily find their way through the bottom, and consequently require to be frequently moved, to prevent the roots establishing themselves in the ground, which, if once allowed to do, and afterwards rudely torn from their hold, checks and deranges the growth very much.

The next affair of importance is the getting the collection replaced in the house before the frosts and inclement weather of autumn set in. There is no circumstance in nature which seems to give notice of the decline, as we have of the advance, of summer, save the general pause in vegetation; which, however, has nothing to do with the commencement of frost. I have known great damage done to green-house plants by a

sharp frost on the 5th of September, though it is seldom dreaded before the middle of October. Yet, as the plants can be treated with full air in a well-constructed house, they had better be placed under its protection too soon than too late: the 10th of September will therefore be a very safe date on or about which to house the plants.

The plants will require but little preparation for this removal; ridding them of faded flowers, dead leaves, irregular growths, moss or weeds, is all that is requisite. If they have been set where it is probable the roots have got through the pots, they should all be moved, and the vagrant roots cut off about a week or ten days before being carried to the house.

There is no particular rule for arranging or placing the plants on the stage. Sometimes they are grouped in families, but more frequently mixed indiscriminately, according to their height, a little intricacy being given to the bank of foliage, by placing conspicuous individuals here and there above the rest.

When the plants are all thus arranged for the

winter, besides the ordinary and daily care in giving air and water, it is time to consider what other plants should be introduced to flower, or be nursed in the green-house. These need not be named; but about the middle of October the first division of Cape bulbs should be planted, leaving the second to be planted in November. These bulbs consist of *Ixias*, *Antholizes*, &c. &c., which, though small, are exceedingly beautiful flowers. This tribe of plants succeed best in sandy moor-earth; and, after flowering, are treated exactly like other bulbs.

Common bulbs, and many other flowers, receive a share of the fostering protection of the green-house; and as the chief pleasure derivable from such a building is during the winter months, every effort should be made to have in it a profuse show of flowers.

OF THE CONSERVATORY.

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THE eligibility of a conservatory for the cultivation and preservation of fine exotic plants has already been noticed; there only remains to be mentioned in this place some few particulars regarding their construction, planting, &c.

A conservatory should always be placed in the pleasure-ground, in that part called the flower-garden. It should be near the mansion-house; and if this has any decided architectural character, the conservatory should partake of it. Whether Grecian, Gothic, or other style, the two buildings should harmonize as much as possible; and the conservatory, though subordinate, may be a highly ornamental appendage to the mansion.

If one of a large size is intended to be built, it should bespan a leading walk. The approach

to it should lead through a shrubbery of the most elegant hardy plants carried up to the entrance at one end, and continued in the same manner beyond the entrance at the other ; the plants within the house being disposed on either hand in the same way. The advantage of this disposition of the plants without and within the house, is to give the idea of an extensive vista or crescent of rare vegetable beauties : and, by passing through the midst of them, to have opportunity of examining every one of the collection to the right and left, consecutively. Such a disposition may not be in all cases practicable ; nor is it absolutely necessary ; but when it can, it should be done. Buildings, and particularly horticultural buildings, require to be backed, flanked, and otherwise accompanied by trees and verdure, so as they are not too much shaded. If standing on a naked base, they look cheerless, and exposed, besides always imposing on the attention whenever in sight.

As the magnitude of living specimens is the main purpose of a conservatory, a select number

of the most beautiful flowering plants should have the principal places ; and planted at such distances as not too soon to interfere with each other. The character of their growth should be also considered ; tall aspiring growers may be placed between those of more humble or spreading growth. In the first years of their growth, there will, of course, be much space unoccupied ; this, however, may be furnished by tall plants in pots, or by quick growing plants, climbers, &c., which may be afterwards removed or cut away without regret. The conservatory should also, at all times, be a place for the display of annual or seasonal beauties.

In order that such a building may be as extensively interesting as possible, it should consist of three divisions. The centre for tropical, and the wings, as before observed, for Australian, Chinese, some American, and European plants. In the choice of these for a conservatory, it is not the rarest that should be exclusively preferred ; but such only as are remarkable for the splendour of their flowers—for the amplitude of their leaves,

elegance of their forms, or for the interest attached to them as emblems, or for historical import. The grape-vine and pine-apple are useful, but not beautiful; therefore, they should not be admitted. The orange and pomegranate are both useful, sweet scented and beautiful, and on this account deserve a place. The hostile *Euphorbia ramosa*, which was planted as a *cheval de frize* in one place for the better defence of Seringapatam, and cut through, though not with impunity, by the van of the British army, has an historical value, and therefore should have a station. The olive of peace—the palm of glory—and the laurel of victory, should all have rank in such an assemblage: and, while gratifying to the eye of the beholder, they may also awaken ideas associated with the countries of which they are natives—of their uses in the arts—or of their importance in commerce.

One fire-place, with branched flues or pipes, may, if properly planned and executed, serve for the whole range. A full command of heat is indispensable: there must be no defect in the

means employed to keep out frost; and this security may be obtained without an extravagant waste of fuel, by only a rightly devised mode of the distribution of that easily conducted and disposable element, heat.

For this power of distributing heat, we are indebted to the recent improvements in metallic enginery; and the value of these discoveries will in no case be of more importance than when applied to the purposes of artificial horticulture. Buildings, whether for the preservation of ornamental plants, or for forcing fruit, will henceforth be more economically, and consequently more extensively, erected than ever; so that no person of fortune, however moderate, need be destitute of such gratifications.

It is not within the scope or prescribed limits of this work to give a particular description of the architecture, viz. plan and elevation of a conservatory; the size and style of finishing always depending on the taste, the pleasure, and purposes of the proprietor. Suffice it to say, that it should be sufficiently high to allow trees

to grow to the height of thirty feet or more, and to be proportionally wide. The frame and roof should be as light as is consistent with its stability. The means for the admission of fresh air, by moveable sashes and ventilators, must be particularly attended to in the construction. The flues, whether for fire, steam, or hot water, should be conducted under the paths, so as not to disfigure or encumber the surface within the building; the paths being formed of wooden or cast-iron gratings. The borders for the plants should be made to the depth of three feet on a dry subsoil; and composed of fresh light loam, leaf-mould, and moor-earth, well intermixed. Some of the tropical plants have thick fleshy fibres, and seem to delight in a loose porous soil; though the palms require rather a tenacious loam. These, and any other plant requiring a peculiar kind of soil, may have it applied to their roots when planted. The columns in the interior of a conservatory are fine stations for climbers; such as passion-flowers, and the like. All plants that are shrubby, and which flower

readily in pots, as Heaths, Proteas, &c. need not be chosen for standards in the conservatory, but admitted as temporary residents only. In short, while it is a repository appropriated to a selection of the most interestingly ornamental plants, it is also at all times a receptacle for every kind or description worthy of cultivation.

There are many beautiful aquatics, and some of them natives of warm countries. For the proper culture of these, an ornamental vase, or basin, four feet or more in diameter, should have a central place. This, half filled with fine rich loam, serves instead of their native mud; and when the roots are put into it, the vase is nearly filled with water, which is kept fresh by occasional supplies. The foliage rises to the surface of the water, and either floats thereon as *Nymphaea*, or rises into the air as some of the *Hedychiums*. In their management, there is one thing should be attended to; that is, to imitate the rise and fall of their native streams. The water should be deepest when the plants are in the most vigorous growth; and when the autumnal pause takes

place, they should be kept almost dry. This pause in their growth causes them, like common bulbs, to present their flowers earlier, and in more strength.

In arranging such an assemblage of plants, and fitting up the interior, I know of no place which admits of greater display, or opportunity for the exercise of fine taste, than a conservatory. Even fancy may lend her assistance in the embellishment. If, for instance, another smaller and similarly shaped vase, supported on a tripod, were placed within and rising to a due height above the first, and a third still smaller in the second, and so on, diminishing to a point, the whole would be an elegant pyramidal form, of considerable surface, on the same spot: and, besides the aquarium base, there would be elevated stations of suitable soil, to receive the magnificent Cacti, and other curious plants of pendulous character. For a like purpose a pyramidal fragment of granite\*, or two obelisks of the same,

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\* Granite would be the most durable; but any softer stone, or even composition, would be more suitable.

having their surfaces hewn into cavities and chinks, to hold a little soil, would be, in some degree, a natural position for the *Mesembryanthemums*, *Euphorbiums*, *Semperviviums*, &c.

Many other devices, besides the very fragile one of coloured glass, will occur to refined taste, to design receptacles, stations, props, &c. for plants, according to their natural characters, whether climbing, trailing, creeping, or pendulous.

Even the seats and tables in such a place (which may be an agreeable apartment in some seasons) should be in character.

Mirrors used to be a part of the fittings up of conservatories; but their effects are too fleeting for the rational mind. The old immense conservatory at Muswell Hill, near Hornsey, built by a scientific gentleman of the name of Beauclerk, was famous forty years ago for containing some very large specimens of Italian plants, and two immense looking-glasses placed in dark recesses at the opposite ends of the building; which (the frames being hidden by foliage) pro-

duced, from the counter and multiplied reflections, an astonishing, though transitory, effect on the mind of a visiter.

As such buildings are usually executed in the course of the summer, the autumn falls to be the time for putting in plants, for which no further directions need be given. The subsequent management consists only in keeping up the requisite degree of temperature, and giving the necessary supplies of water, as circumstances direct.

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## OF THE FORCING-PIT.

THERE are but few places, where flowers are cultivated to any considerable extent, but have a forcing-pit for bringing forward early flowers for the embellishment of the drawing-room, green-house, or conservatory. It is only a hot-house on a small scale. Walls of brick-work, a fire-place, and its flue carried round on the

inside, close to the walls, embracing a pit or bed of tanner's bark, leaves, or well prepared stable dung. It adds much to its convenience to have a narrow path in front, as well as at the back of the tan-pit within ; and which requires to be pretty deep, in order to allow head-room in placing and attending to the plants. The pots of plants to be forced are previously prepared in the autumn, and are set on or plunged in a surface-layer of dry saw-dust, laid on the fermenting material, soon as the heat is sufficiently moderate. They should be as near the glass as their height or growth will allow ; the strongest light and freshest air are necessary, as well to give strength as colour and scent to the flowers. The sashes are moveable, for the purpose of giving air ; and which is admitted, more or less, as the heat in the bed, or weather, allows. Fire-heat is only used when that of the bed has declined, or when a covering of straw mats, or common Russia mats, is insufficient to keep out frost. Besides being particularly suitable for forcing early flowers, it is also a fit place to

raise seedlings, strike cuttings or layers, or recover sickly plants at all times of the year.

These are the buildings which affluence and taste, by the aid of practical skill, has had erected for keeping exotic, and flowering at pleasure hardy plants. They yield to the proprietor much pleasurable amusement, and the high gratification of possessing in a northern clime many of the vegetable gems and sweets of the glowing and exuberant south.

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## OF THE LAPIDIUM, COMMONLY CALLED ROCK-WORK.

As a flower-garden is a receptacle for every thing that is gay and beautiful in the vegetable kingdom, so every kind of soil and habitat natural to the plants respectively, should be, as nearly as possible, imitated; not only as a means conducive to their free growth, but in order that they may be seen in their domesticated state as

they are most generally seen in nature. For this purpose we have lapidiums, or Alpine-plant borders, which are only a congregation of rugged stones. In the interstices of these, the plants are put, either on the dry summit, or in dark recesses under the largest blocks. And though such a harsh feature may be dispensed with in a simply beautiful flower-garden, it is absolutely necessary in an extensive botanical collection, where the object avowedly is, to get together and present every vegetable production found on the varied face of the earth; whether among craggy rocks on high, or on the extended savannas of the low latitudes. Alpine plants, therefore, which constitute a very large and beautiful portion of our collections, are treated with a situation and exposure as like their native habitat as it is possible for art to accomplish. Many of the mosses, lichens, and especially the beautiful family of ferns, cannot be cultivated successfully, nor indeed would they look well, if unaccompanied by fragments of stone or other marks of uncultivated nature.

## OF THE AQUARIUM.

As suitable places are prepared for the plants of the hill and dale, so also must a situation be found for the vegetable inhabitants of the lake or river. A large basin of water in a garden is always an useful appendage, independent of its utility as a station for water plants. If supplied by a fountain, or artesian well, it may be particularly useful; as always affording soft and tepid water for every purpose of the gardener, and peculiarly suitable for aquatics that are rather tender, and also for gold and silver fish. They are usually made of a circular or any other regular form; the sides of brick-work, with a hewn stone coping, and on a subsoil impervious to water, or made so by puddled clay. The back of the brick-work should also be puddled, to prevent leakage.

If this feature can be introduced in a nook or recess of the lapidum, it will be perfectly natural, as well as suitable.

## PHYSIOLOGY OF TREES.

HAVING made some remarks on the physical structure of the plants treated of in the foregoing pages, it may be expected, perhaps, that somewhat should be added on the physiology of trees. This is the more necessary, as it is a part of botanical knowledge which is still very obscure : for, though many eminent naturalists have employed their talents in the study and illustration of vegetable phenomena, and though much of the hidden processes has been brought to light, still the opinions of the learned are conflicting ; the science is mystified by hypothetical schemes of vegetable life and economy, which can neither be proved nor clearly understood. Every lover of the science, however, is indebted to those indefatigable individuals, who, by constant observation, dissection, and close examination of the various parts of vegetable conformation, have so clearly shown the effects, if not the causes, of vegetable life.

It would be right, perhaps, to preface the following observations by giving a view of all the different opinions promulgated by botanical physiologists, from Grew down to Poiteau: but as this would embrace a great bulk of obsolete matter, it is as well omitted. I shall therefore proceed to describe, as plainly as I can, the different parts and organization of a tree, availing myself of every discovery of science which is agreeable to and has been confirmed by practice, and of every result of practical agency which is sanctioned by the principles of science.

Soon after the first appearance of the *plumula*, or rising shoot from the seed, we find, on making a transverse section of the stem, that it consists of a central pith enclosed in a cylinder of fibrous matter, perpendicularly arranged, this having on its exterior a thin separate film of bark; the whole being saturated with sap peculiar to the plant.

*Of the pith.*—The pith, or medulla, is so called, because it resembles the marrow of a bone. It is only a temporary part of the stem; compara-

tively large in young shoots, but gradually becoming less, and in very old trees hardly perceptible. It appears in the crowns of the roots as well as in the stem, and extends through the branches into every the minutest twig. As an organ, its use is not apparent, as it is the first to decay; and stems and even young shoots live very well and long after being deprived of it. It most probably only acts as a support to the infant stem, and as a reservoir of moisture to sustain it against drought.

*Of the fibrous cylinder.*—This principal organ of the stem surrounds the pith, and is composed of a closely united body of ligneous fibres (embedded in cellular membrane, the cellules of which are arranged horizontally), forming, of and among each other, various sized tubes and interstices, perpendicularly arranged, and extending from the collet or bottom of the shoot to its utmost height; and from the collet downwards over every root. At the end of the summer's growth it forms a cone, embracing the pith already described. During its growth it is called cambium;

but when arrived at its full size, which it does in about seven months, it receives the name of white wood, or alburnum. It is the origin of the perfect wood, for ever after occupies the centre of the stem, and retaining its first form, position, and dimensions unaltered. The ligneous tissue of which it is composed longitudinally, is crossed by rays\* of the same substance, which converge from the bark to the pith. The cambium is the seat of the vitality of the plant; it contains the rudiments of both roots and shoots, as well as that specific energy which, under the excitement of surrounding elements, produces all the future expansion of the vegetable being.

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\* Medullary rays is an old term amongst physiologists; but the term and the appearance of the rays on a transverse section have led into error; they have been conceived to be only simple lines, and, as such, have been supposed to be the umbilical tracks or rudiments of buds. But this idea cannot be admitted as probable; because medullary rays exist in the internodal parts of stems where no buds ever appear; and, moreover, these rays are not simple lines, but vertical partitions of the grain of wood, extending from the bottom to the top of the stem, dividing the circumference into triangular segments.

*Of the bark.*—The bark is a distinct member, thrown off from the cambium as an excremental cloak or covering, over the whole surface of the plant, root as well as stem. In the first year it is a thin transparent film, called the cuticle, which for ever afterwards remains on the exterior. If permanent, the bark is increased in thickness every following year by a layer discharged from the cambium to its interior surface; the outer layers are called the outer bark, and the inner layers are called the liber. The age of a tree may be accurately ascertained by counting the number of layers of which the bark is composed; its laminated structure is very conspicuous in the common lime, and many other trees; and is attached to the stem by the medullary rays of the wood, by the buds, shoots, and sometimes by radicles which force their way through it.

These three parts compose the seedling stem. They previously existed in the seed, and are developed by elongation and expansion; no additional membrane being added either at top or bottom. The leaves are seated on the bark, to

which they are only temporarily attached ; they also having pre-existence before development. Indeed, it is most material to remark, in this place, the important fact, that every part of a plant displayed in the course of time previously exists in embryo ; vegetable life being only the expansion of incipient organization which is gradually excited into form and amplitude by the stimuli of heat, air, and water.

The above description of a shoot from a seed, is applicable to every shoot afterwards produced from a bud.

If we examine a transverse section of a two-year old seedling, we shall find that the pith maintains its place, though somewhat reduced in diameter : that the cambium of last year has now become perfect wood, but remaining of the same size and figure it had at the end of the first summer ; that a new circle of alburnum has been formed on the outside, involving the first ; and that this is defended by two films of bark, the inner one having been added at the same time with the new alburnum. This is the process that

takes place in every succeeding year during the life of the tree; the central axis or cylinder of wood becoming annually enlarged in diameter by the addition of a ring of alburnum, the whole serving as a support to sustain and elevate the branched head of the plant.

Respecting these annual accretions of alburnum\*, a very important question forces itself upon our notice, viz. Whence do these additions originate? They have been already described in both their conditions as cambium and alburnum; but their origin has not been adverted to. Indeed, of all the processes of vegetation, none is so obscure as this. Its rise and progress into being

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\*The annual rings of wood are very visible on a cross section of the trunk. The number indicates the age of the tree. In some kinds of trees, as the beech, for instance, the alburnum, or sap-wood (as the timber-dealers call it), is perfect in the second year; but the alburnum of oak is not perfect till the sixth or seventh year. This is very obvious on view of a section; six or seven of the outer layers will be sap or white wood, and all the interior layers towards the pith will be mature, as the colour shows. This fact also shows that the new layer of oak formed this year (1829) will not be perfect *heart*y timber till the year 1835.

are hidden from daily inspection. Examination, by frequent incisions through the bark, give but an imperfect idea of how and when the fibrous organization of the cambium first appears, and whence it is derived. This is a point on which there is at this time much diversity of opinion; and when the difficulties of having ocular proof of the phenomenon are considered, there is no wonder that physiologists differ so much from each other respecting this occult part of the science.

Some of the most eminent writers on the subject imagine that the sap is changed, chiefly by the elaborating powers of the leaves, from a crude, watery state, to what they call mature or perfect sap, and this is conceived to possess a property which is deemed, *per se*, "organisable;" that is, when sufficiently abundant and mature, it is transformable into all the membranes, various organs, and components of the plant. One distinguished botanist believes the new accretion to be only a *dilatation* of the alburnum, while others maintain, that the ligneous matter of the new

layer is formed of the radicles which descend from the superior buds between the wood and the bark, which uniting with the converging rays in their passage down, compose the new layer. Differing from all these, another idea has been entertained, which supposes the living principle to be a distinct organ of itself, always situated between the wood and the bark, and annually divisible into layers of bark and wood for ever.

Now, as one or other of these opinions are held by many men of the first authority and respectability, as well in science as practice, it is worth while to examine these opinions, in order to show how far they are consistent or inconsistent with the laws of nature, or agreeable to practical facts and observations.

With respect to the doctrine that all the accretions of a plant are formed out of the matured juice, it will be necessary to consider first the nature of the sap itself.

The sap of vegetables has been very justly compared to the blood of animals. It is not an organ, but a constituent only, which pervades,

distends, connects, and invigorates the whole system. It is increased by supplies imbibed by syphon-acting tubes from the earth, and also by absorption of moisture from the air. It is found of many different qualities in different plants; each kind of plant possessing peculiar powers and structure for elaborating, concocting, and assimilating the qualities of the earth and air, so as to form specific combinations proper to itself. Thus the *Pinus* genus possesses an organisation and a fountain for the production of resin; *Mimosa*, gum; *Ricinus*, oil; &c. Other plants elaborate sugar, starch, &c.; and though these specific qualities are often more concentrated in one part than in others, yet the whole plant partakes of them in a greater or lesser degree.

Sap is of various consistency; in some plants it is like pure water, without colour, scent, or taste. It is, on the contrary, in some coniferous plants so inspissated, and (whether left in a cavity of the timber, or withdrawn by tapping) becomes so concreted that it resists edge-tools, and so indurated as to last for ages, unless de-

composed by the action of heat or water. But in no state is it ever found by analysis to contain anything like fibrous matter from which organs might be formed; it ever remaining a homogeneous mass, and quite destitute of any special structure to indicate conformation. Chap-tal, indeed, is said to have detected fibrous matter in the sap of some trees; but this solitary instance is not corroborated by any subsequent experimentalist or writer on the subject.

While occupying its natural station in the plant, we see it at different times more or less fluid. In the spring it becomes exceedingly liquefied, and discharged from wounds as limpid as rock-water; though, if long exposed to the air, it becomes inspissated into gum on stone-fruit trees; or corrupt like sanies oozing from wounds on the elm. Its motion in the spring and beginning of summer is rapid; but is arrested and congealed by the cold of autumn; and during winter it assumes a clammy consistence, and then only acts like a cement to the fibrous organisation of the new and old wood and bark.

It is never so thickened in the roots, during winter, as it is in the stem and branches; the warmth of the earth keeping it always in a state of fluidity.

If then the sap of trees be only as it is here described, how can it possibly have the alleged property of "organisation?" How can ligneous fibres, tubes, cells, flowers, and fruit, be formed out of a mass of homogeneous jelly, gum, or resin? The perfect sap is said to be prepared by the leaves, and, when elaborated, is returned again into the interior of the plant, to form those new accretions which take place during the summer. If it were said that its elaboration is accomplished by the leaves perspiring away its aqueous portion, and thereby leaving a more substantial juice to be disposed as cement, to give solidity to the wood, it would be a feasible representation, and moreover, a representation that could not be disproved. But when it is maintained, that this elaborated juice is transformable into all the other essentials of the plant, practical knowledge hesitates to give its consent; because there are

many circumstances which militate against such doctrine.

It is always considered, in practice, that matured sap is one thing, and organisation is another. If they be the same thing, they will invariably produce the same effects in all similar cases; at least we should expect so. But that this is not the fact, the following instances will show:—

Choose, from a well-ripened healthy shoot of a grape-vine, an internode piece, that is, a piece deprived of its nodes or joints. After ascertaining that it is perfectly sound wood, and of course fully charged with matured sap, let it be planted as a cutting in the most favourable situation, affording it every assistance from artificial heat, and every other auxiliary means that practical experience can devise. Will this repository of perfect sap ever produce a shoot? No, never; temporary rootlets may be produced; and though the cambium may be put in motion, and even show its callosities at each end, nothing like a shoot will ever come forth. Again, tubers are

said to be the depositories of the matured sap sent down by the foliage. A potatoe, for instance, contains a decided store of this organisable matter: but divest this tuber of its gems or eyes, it instantly becomes a *caput mortuum*; this concentrated body of organisable life becomes inert, and quickly submits to putrefaction.

One of the principal arguments in support of this strange doctrine is drawn from the circumstance, that a fruit tree, in high vigour, is less fruitful than one of a moderate or even weakly growth; and if this vigorous tree receive a check, it almost immediately becomes prolific. This, it is said, is occasioned by the sap, in consequence of its stagnation, becoming eminently mature, and expended in the formation of flowers and fruit, instead of being rapidly wasted in the production of wood. But the fact is, flowers and fruit are not so expeditiously formed as this supposition would lead us to believe; they have existence in the shoot long prior to their appearance on its exterior. The rapid growth of a shoot is not by an evolution of its central parts,

but a simple elongation of those components which existed and composed it even in the bud. Its parts are magnified, not multiplied. When the growth receives a check, those parts of the system which lie more immediately in the influential and central current of the sap rising from the roots, will receive a stronger impulse than those on the exterior, which are further removed from it; consequently, the flowers which are generally, though not universally, seated on the pith, receive the whole impetus of the subdued vigour, and hence burst forth into view.

Many other examples might be brought to prove that the organisable property of the sap is not sound philosophy. The very arguments brought forward in support of it are at least ill chosen. It has been compared to the agency of the blood of animals repairing a wound, or filling up a separated part of a muscle of a living body; and to the formation of the chicken from the homogeneous fluids of an egg! But the cases are quite dissimilar: In the first, the blood only assists by enlargement and elongation of the

vessels and organs *already there*: and as to the second, it is well known, that the vital speck or rudiment of the chick is formed in, and proceeds from the oviary of the hen, and (like the spawn of fishes and reptiles) only requires the vivifying influence of the male to excite it into life and perfect form during incubation.

But there are other difficulties attending this supposed generative property of the sap. As accretions take place over the whole plant, and as the leaves are the supposed laboratories of this organisable matter, means must be invented for the conveyance of it from them to the lower parts and roots of the plant. For this purpose descending vessels are necessary, i. e. ducts which allow the prepared sap to sink somehow or other into the inferior parts of the system. Hence the trunk of a tree must be conceived to consist of a most complicated tissue of vessels, to permit the counter currents of the simple and matured sap. Indeed, so occult are the processes, that it cannot be explained without recourse being had to almost all the powers of

nature, viz. gravitation, attraction, positive and negative electricity, &c. to make out a feasible hypothesis. The matured sap is made to descend from the topmost spray of the Lombardy poplar, and to *descend up* the pendant branches of the weeping ash or willow ! But the practical eye is not distracted by such anomalies. By a very slight examination, we find the sap distributed, at all times when in motion, over the whole surface of the last year's alburnum, on the highest shoot as on the lowest part of the stem : and when not in motion, it is equally apparent resting, in an inspissated state, in the tubes and cells of the wood, and between the wood and bark. This is an undeniable fact ; and if it be, why should physiologists puzzle themselves by inventing a peculiar system of vessels, for the purpose of accounting for the fancied motions of the sap, by conveying it *unnecessarily* from one place to another ? Can a topmost shoot or any other part of a healthy plant be found at any time divested of it ? Can the keenest eye, assisted by the most powerful microscope, discover

any difference in the structure of the stems of the *Helianthus annua* and the *Helianthus tuberosus*? In the latter, descending vessels must, as it is said, exist; but in the former they must be wanting. The petioles of all biennial plants must be furnished with descending ducts to carry the prepared sap to the roots or bulbs, in the *first* year, but must be destitute of such organs in the *second*! Nay more; if, as has been already observed, a single leaf of a carrot or turnip, for instance, stands over the winter, its function will be different in the second than it was in the first season.

The descent of the sap is, however, a very old idea, and has long been received as an established fact. The following circumstances have always been considered as proofs that there is a downward as well as an upward course: viz. a common holly or jasmine, budded with a variegated sort, will afterwards throw up from the roots variegated suckers. The attachment formed by inserted buds or grafts and the stock is a union of the cambium or vital membranes of both

the scion and stock\*. A wound through the bark heals by protrusions of new wood and bark *downwards* faster than by new processes *upwards*; and, in the same case, the sap distils, it is said, from above more copiously than from the lower lip of the wound. When a branch or young shoot is bound by a ligature, it swells more above than below the band. All these circumstances shew clearly that there is a downward motion of some component of the plant, otherwise the above effects could not take place. These effects, however obscure the cause, cannot be accounted for by attributing them to the descent of the sap.

The next hypothesis to account for the annual enlargement of the stems of trees is one which admits the change of sap from a crude to a mature state, and also its ascent, descent, and lateral transfusion in the body of the plant; but, instead of attributing the formation of the new

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\* If the matured sap be impelled upwards in the spring, as part of it is said to be, along with that received from the roots, why are not grafts tainted with its organisable properties?

zone of cambium to the organisable property of sap, asserts that it is composed of a *dilatation* of the alburnum. This is a most rational supposition; because not only agreeable to natural appearances, but also accounting for the fibrous organisation which so soon appears in this new member of the stem. But, unfortunately, this specious conjecture is not true; because the alburnum suffers no diminution, but remains ever after of the same form and dimension it had at the end of the last year's growth; which could not be the case, if any part of its exterior surface was sloughed off to form the new layer.

Another idea has been entertained respecting the annual growth of the stem, and which appears to be gaining ground, particularly in France. It admits the striking similarity of seeds and buds; and supposes, that as every seed produces roots as well as a stem, so every bud produces radicles at the same instant that its leaves, &c. are in progress of development; which radicles, entering into the then lubricated space between the last year's wood and the bark,

and there plunging into the liquefied sap, descend in close array, anastomosing as they proceed with the medullary rays which cross their path, and together furnish the fibrous matter of the swelling cambium. This, it is said, shews how readily rootlets are produced from cuttings—how inoculated buds or grafts fix themselves to the stock; that it is not the matured sap which descends, but the radical vessels themselves, and they it is that carries with them the colours and forms of the parents whence they have descended. It accounts for the appearances observed on strangled branches, and particularly for the upper sides of wounds closing faster than the lower. It also accounts for the production of shoots from the trunks of trees which have been long felled. In short, there is hardly a circumstance in the ordinary phenomena of vegetation which may not be satisfactorily explained by the application of this hypothesis.

Notwithstanding the feasibility of this notion, however, it is liable to one or two objections, which fall to be noticed. It should be remem-

bered, that a lofty tree, when it first receives the enlivening impulse of spring, has its bark closely embracing the surface of the alburnum. The first signs of life are the bursting buds externally, and the liquefaction of the sap internally. Soon after this, the bark is raised from the wood by the expansive power of the sap, now assuming the appearance and receiving the name of cambium, and shewing itself at the bottom of the lofty trunk almost as soon as it does at the top: we cannot conceive, therefore, how the descending radicles can reach so far down in so short a time:—how they should descend the distance of sixty or eighty feet in a few days is inconceivable. Another question follows: how does it happen that the new layer of liber is formed out of these descending radicles so distinctly and separately from the body of the new alburnum, as well as from the last year's liber? And whence some of the gems which so soon after appear to rise from these descending radicles? Such phenomena *may* take place; but the explanation is difficult.

We now come to the last hypothesis which has been propounded to account for this obscure process of vegetable life. It differs from all others, by denying that the new accretions are formed from the generative property of the sap, or that the cambium is a dilatation of the alburnum of the former year, or that it is supplied with fibrous matter entirely from the superior buds ; but that the vital principle of the tree is a *distinct organ* always situate between the wood and liber, and that it is that component of the system which is susceptible of and receives the action and influence of the surrounding elements, occupying the place and appearing in the character of cambium during its summer growth, and, when this is over, reposing as a thin body on the exterior surface of the new alburnum, and within the new liber which has been thrown off at the same time. While in this latter state, that is, from the time when the growth is arrested in the autumn till its recommencement in the spring, it occupies a very inconsiderable space, appearing on the transverse section only like a very

narrow compressed line. Yet, in this slender cylinder of vitality, it may reasonably be inferred, are comprised an infinite number of layers of incipient alburnum as well as of bark.

In a former part of this work it has been stated, in describing the physical conformation of bulbs, that their radical plates are composed of an endless succession of gems, which are developed in the order of their seniority; so the vital envelope of a tree is annually and constantly divisible into layers of bark and wood for ever \*.

This narrow shell of vitality did contain all the buds and roots that have been, and does contain the rudiments of all that ever will be developed; the gems not floating loosely in the sap, as has been conjectured, but borne on the vital membrane and there remaining inert, or developed when circumstances are favourable. These gems, though imperceptible, from their extreme minuteness, are variously located in the

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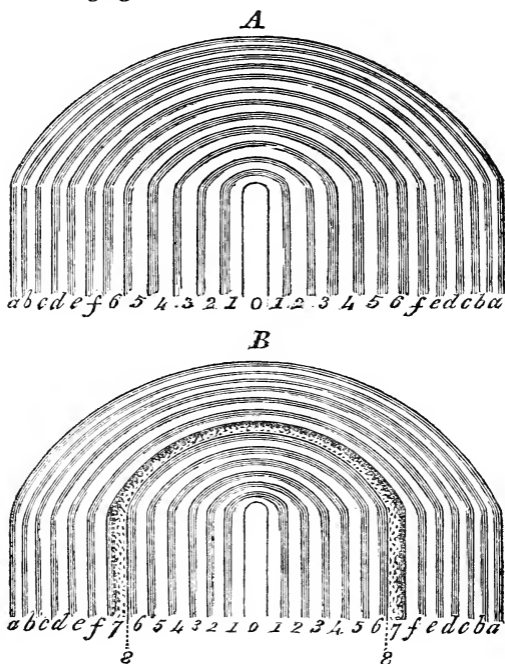
\* Though trees which do not stole are liable to decay after a certain period, yet those that do, or are capable of being perpetuated by art, may be said to continue for ever.

stem, according to the kind or peculiar structure of the plant;—on every part of the trunk and branches, as the myrtle; and at the nodes only, as the grape-vine.

These gems mostly remain dormant, though all of them may be prompted into action according to the circumstances of position or extraordinary impulses of constitutional vigour, especially if the stem be damaged, or cut over, immediately above their station; in which case they will burst through the bark, or occasionally may be seen issuing from the protruding cambium, oozing out round the last year's alburnum at the top.

These facts are quite apparent to the most careless observer; and shew to a certainty the seat of vitality, whence proceed all the increments of the vegetable being. The only difficulty lies in conceiving how infinite gradations of matter can previously exist in finite space; how innumerable folds of bark and wood can be produced from a layer scarcely perceptible during the winter half-year. Still it is an unquestionable

fact; and though not easy to describe, may easily be comprehended by the assistance of the following figures:—



The preceding figures are representations of half a transverse section of a stem, six, and six and a half years old. In figure A, *o* is the pith; *1* is part of the first formed cylinder of wood, or

alburnum of the first year; 2 is that of the second; 3 of the third, and so on to the sixth. *a* is the first epidermis or layer of bark with its rough exterior; *b* the second; and so on to *f*, which is the last or liber of the sixth year.

Figure B is a section of the same stem cut in the month of June of the seventh year. The layers of wood and bark are shewn in the same order as in fig. A, with the addition of the cambium of the seventh year partly developed. Its outer boundary line is the liber of the seventh year; and the dotted space within is the cambium swelling into volume, and pressing before it in an outward direction all the previously formed layers of bark, thereby adding to the diameter of the stem. By this internal increase the first layers of bark are split into vertical fissures, as in Oak, Elm, &c.; divergingly stretched, as in Beech; or thrown off, as in the Plane, Vine, and *Arbutus andrachne*.

The cambium, thus increasing, is gradually charged with its peculiar organisation of fibrous matter, tubes, cells, &c. containing that vital principle called vegetable life. It separates from

the last year's alburnum so entirely, that its existence as a distinct membrane cannot be doubted: no disruption or dilatation, as before observed, takes place, except where the medullary rays pass from the bark into the wood.

The liber of the seventh year is also formed in the summer. It is a slough, thrown off from the swelling cambium, but quite distinct, and is no more connected with the cambium at the end of the growing season than the cambium is with the last year's wood, except only by the converging rays which seem to connect together the whole structure of the stem.

The dotted space 7 (fig. B), is the increasing cambium, or new layer of wood, of the seventh year, which only occupied the line 8 during the previous winter, and will be confined to a similar line on the exterior of the dotted space during the next. Hence it will be observable that the vital principle shifts its place every year. The alburnum which by its agency was distended into complete form last year, is deserted by it at the beginning of this; but whether dormant, as it was on the line 8, or actively swelling, as in

the dotted space 7, it contains the rudiments of all the liber, roots, buds, &c. that ever will be produced by the plant; of this there needs no proof.

In order to shew that the opinion founded on the above-represented facts is not a mere hypothesis, a few proofs may be brought forward, or rather recapitulated, by way of illustration.

There can be no doubt that all the different parts of a vegetable, developed during its existence, are previously contained in embryo, or state of incipience; vegetable life, as before observed, being only an expansive power of the essential sap enlarging the vessels which contain it, when acted on at the proper season by a sufficient degree of heat; or, as it would appear in some cases, when the juice by a certain maturation or chemical change of itself takes a kind of fermentation, and expands independently of atmospheric heat. Thus many plants whose vernal growth is soon over, recommence it during winter and before the increased heat of spring can affect

them ; witness the early movements of bulbs and amentaceous plants.

Trees and shrubs are individuals as far as they have a pith, bark, and a covering of vitality in common, but individuals in so far as they are divisible both by nature and art : naturally by seeds and suckers : artificially, by cuttings, budding, grafting, and layering. In all cases, the organisation and increments proceed from the cambium, as has been repeatedly stated ; and as vegetable life is no other than the development of pre-existing organisation, we must allow that there must be some connecting membranes which unite the parts with the whole. The equivocal generation of plants, or even parts of plants, is not more absurd than is the equivocal generation of animals.

I am quite aware that questioning the validity of this old idea, viz. the descent of the sap, will meet the opposition of many very experienced men, both scientific and practical : even the woodman will remonstrate, and triumphantly ask why

the stem and branches of a tree contain less sap in the winter than in summer? The question deserves an answer, and may be replied to thus:—The supply of crude sap from the roots is certainly more abundant in the vegetating seasons than in winter; and this, added to the stock of sap which was arrested by the cold, but now, by the spring warmth, highly liquefied, causes a most copious flow. During summer and autumn, however, the aqueous part of this flow is expended and transpired away, leaving the grosser parts lodged in the vascular members of the stem and branches, in the interior, and sometimes on the exterior of the buds for their preservation. The woodman is therefore perfectly right in thinking that the sap is more active in the stem and branches in summer, and more fluid and active in the roots than in the stem in winter; but he is wrong in concluding that the activity in the latter case is owing to its having subsided from the top to the bottom of the tree. The fluidity of the sap in the roots

has already been adverted to, page 252, and no one who is aware that the vessels of the roots are at all times replete with sap can possibly imagine that they have capacity for such a surcharge.

In recurring again to the most obscure part of the above sketch of vegetable life and constitutional development, a few additional observations may conclude this section of the book.

The arrangement of the structure has been set forth under the proper names of pith, wood, and bark. These are the three principal constituents of the stem or trunk ; and which are all in a state of gradual change, by annual accretion or transformation ; and, while undergoing a change, the processes receive temporary distinctions for the better describing the parts. Thus the last year's layer of bark is called the liber ; and the last year's ring of wood is called alburnum : but these, during their growth, are both designated cambium. This cambium is the seat of life ; is composed of an indefinite number of layers of bark and wood ; one of each

being thrown off and developed in each year; the first to increase the thickness of the bark, the second to increase the body of wood. Strictly speaking, both these are only excrementitious parts of the plant; the first as a general protection or covering, the second as a temporary support. In watching the annual growth of a tree, it is only these increments of the stem which are detectable by the eye, and these but imperfectly till they are displayed into form and substance. The incipient cambium occupies in winter so inconsiderable a space on the exterior of the last year's alburnum, that its wonderful complication of parts cannot be distinguished; and when examined, after it has swelled to the thickness of one-twelfth of an inch, its fibrous or membranous components are so colourless and transparent, that neither their forms nor positions can be ascertained. It is this indistinctness of the organs in this stage of their existence which led to the opinion, that the perfect sap generated the organs—a circumstance which, were it true, I believe, has no parallel in Nature.

To shew that the cambium is a separate and distinct organ from the alburnum of last year (except by the insulated attachments before described), we may only instance how completely the former separates from the latter. This is strikingly visible to the bark-peeler, or on the accidental disbarking of a standing tree. In both cases the cambium comes off with the bark, leaving the surface of the wood completely denuded, except small portions which remain in the indentations and chinks of the latter. In the case of a standing tree being disbarked, the cambium gradually closes over the wound, in the way previously described; but if the naked surface of the wood remains long exposed, and becomes hardened by the air, though many new layers of wood will be formed over it, no intimate union ever takes place between the layer that was exposed and the new; the scar ever remaining a flaw in the timber: shewing that, notwithstanding the cambium parts easily from the wood when young, it forms a close union with it while growing to perfection. The junction

between the last and the present year's layers is, however, always very distinguishable in the timber; the inner side of every year's layer being fuller of large tubes, and consequently less solid than the outer side, which is formed in the autumn, when the vigour of the growth is subdued.

It is worthy of remark, too, that where the alburnum has been stripped of its bark, if small portions of the cambium have been left in the fissures of its surface, these will also swell and readily unite with the collapsing cambium in its way over the wound.

It is unnecessary to describe the other parts of plants, viz. the root, leaves, stipulæ, flowers, and fruit, further than has been already done in the directions given for the cultivation of the plants especially treated of in the foregoing pages. All these parts and their functions are pretty well understood; and have been far better described by others than by any additional remark that can be made here. Neither is it necessary that

allusion be made to the chemical agency attributed to plants ; their susceptibility of electric action ; the different vessels discovered in the wood and bark ; their forms, uses in the system, &c. &c. ; all which discoveries being far beyond the reach of practical penetration, and proveable only by the exercise of chemical and physical philosophy, need neither be scrutinized nor reiterated here.

Those living authors, whose opinions I have so freely canvassed, and with whose ideas of vegetable life and processes I have been compelled to differ, I can only take the liberty of referring to the arguments by which I have endeavoured to substantiate my allegations, for justification in dissenting from such high authorities. But to their candid consideration I respectfully submit my statements, trusting that what I have advanced on the subject may at least lead to clearer views of physiology, and be accepted as a mite thrown to the general stock of botanical knowledge.

And while I acknowledge having availed myself of much valuable information contained in previous publications, I must not omit returning my best thanks to Messrs. SWEET, GROOM, and other floricultural friends, who obligingly answered every question proposed to them by me on the general subject. And while discharging these debts of ordinary civility, I should be doing injustice to my own feelings, did I neglect to acknowledge my entire satisfaction in finding that I stand not alone in opinion relative to the physical constitution of bulbs ; but am preceded by a Lady whose penetration is only equalled by the spirit she has evinced in freeing herself from the trammels of obsolete science, and given a lesson even to her preceptors. I mean Miss MARIA ELIZABETH JACKSON, of Somerset Hall, Staffordshire, the elegant authoress of "The Florist's Manual," and other elementary works on Botany. I have only seen her Florist's Manual ; but the few remarks contained in this, I must say, transcend all that has been previously

published on the subject. Thus it is frequently seen, that in the galaxy of science it is not the stars of the first magnitude which emit the brightest light, their broader beams being often outshone by the scintillations of the minor glories of the sky.

J. M.

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## No. 1.—A LIST OF BORDER FLOWERS,

ESTIMABLE FOR THEIR EARLY FLOWERING, BEAUTY,  
OR FINE SCENT.

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### BULBS AND TUBERS.

GALANTHUS. SNOWDROP.

Nivalis, common.

——— double.

ALLIUM. GARLIC.

Inodorum, Carolina, &c.

BULBOCODIUM. BULBOCODIUM.

Vernum, spring flowering, &c.

CROCUS. CROCUS.

Biflorus, flavus, vernus, mæsiacus, pallidus, reflexus,  
sulphureus, susianus, versicolor.

ERYTHRONIUM. ERYTHRONIUM.

Americanum, Dens Canis.

FRITTELLARIA. FRITTELLARY.

Imperialis, latifolia, obliqua, Melcagris, persica, racemosa.

MUSCARI. GRAPE HYACINTH.

Amethystinus, botryoides, cernuus, moschatum, racemosus, scrotinus.

## IRIS. RAINBOW, OR FLEUR-DE-LIS.

Persica, susiani, tuberosa, biflora, lutescens, pumila, variegata, Germanica, pallida, versicolor, and many others.

## IXIA. IXIA.

Bulbocodium.

## NARCISSUS. NARCISSUS.

Albus, angustifolius, bicolor, biflorus, bulbocodium, elatior, compressus, incomparabilis, Italicus, Jonquilla, pyraceus, poeticus, Pseudo-Narcissus, Tazetta, tortuosus, and many others.

## ORNITHOGALUM. STAR OF BETHLEHEM.

Luteum, nutans, comosum, striatum, uniflorum, &c.

## SCILLA. SQUILL.

Amæna, bifolia, Lilio-hyacinthus, Italica, nutans, præcox, sibericus.

## HELONIAS. HELONIAS.

Bullata, asphodeloides, longifolia.

## TRILLIUM. TRILLIUM.

Cernuum, erectum, grandiflorum, &c.

## TULIPA. TULIP.

Biflora, sylvestris, clusiana, suaviolens.

## AMYRYLLIS. AMYRYLLIS.

Atamasco, Belladonna, lutea\*.

## ANTHERICUM. ANTHEMICUM.

Liliago, Liliastrum, ramosum, scrobinum.

\* These bulbs require to be planted deep in the ground if not taken up in the winter.

## ARETHUSA. ARETHUSA.

Bulbosa.

## COLCHICUM. MEADOW-SAFFRON.

Byzantinum, autumnale, variegatum.

## CONVALLARIA. SOLOMON'S SEAL.

Bifolia, Japonica, latifolia, majalis, multiflora, Polygonatum, racemosa, stellata, verticellata.

## CYPRIPEDIUM. LADY'S SLIPPER.

Acaule, arietinum, calceolus, parviflorum, pubescens, album.

## LEUCOJUM. LEUCOJUM.

Æstivum, pulchellum.

## LILIUM. LILY.

Camtschatka, cordifolium, Pomponium, aurantium, bulbiferum, candidum, chalcedonicum, concolor, Japonicum, Martagon, monadelphium, Pennsylvanicum, suberbum, trigrinum, canadense, Catesbæi.

## PANCRACTIUM. PANCARTIUM.

Illyricum, maritimum.

## TRADSCANTIA. SPIDER-WORT.

Virginica, rosea, subaspera.

## UVULARIA. UVULARIA.

Amplexicaule, grandiflora, perfoliata, flava, lanceolata.

## COMMELINA. COMMELINA.

Communis, virginica.

## GLADIOLUS. CORN-FLAG.

Communis, byzantinus, cardinalis, imbricatus, psittacinus, natalensis.

## HEMEROCALIS. DAY-LILY.

Disticha, cærulea, flava, graminea, alba, purpurea, fulva

## HYPOXIS. HYPOXIS.


Erecta.

## PARDANTHUS. PARDANTHUS.

Chinensis.

## TIGRIDIA. TIGER-FLOWER.

Pavonia.

 Many of the Orchideæ are suitable for shady borders, viz. the different genera of Orphrys, Orchis, Cypripedium, Satyrium, Serapias, Neottia, Gymnadenia, Aceras, Herminium, Listera, Epipactis, &c.

## DAHLIA. DAHLIA.

Frustranea, superflua.

This is one of our most splendid autumnal flowers. There seems to be no end to varieties obtainable from seed; and their cultivation is as easy as it is generally known. The seed, sown early in spring, will flower in the end of summer. The tubers must be taken out of the open ground in the autumn, and kept in a dry place out of the reach of frost in winter. In the early spring the tubers of the favourite kinds are divided, and put into pots six inches diameter, and kept in a house or frame till all danger from frost is over, when they may be turned out in the borders. They are readily and expeditiously propagated by taking the first shoots which rise from the tubers and striking them in a little heat. Such young plants produce the handsomest flowers. They flower earlier, and grow more dwarfish in the poorest soil; and if very large flowers are desired, all the inferior branchlets must be thinned out.

## CAPE BULBS.

Under this character are ranged Ixias, Antholizas, Gladiolus, &c. almost all of which are delicate and diminutive.

tive plants. They are usually potted in light sandy soil, and kept in pots or frames during their flowering season. Some of them succeed on a warm dry border ; where, if planted five or six inches deep, and covered with dry litter, they will stand the winter ; but a safer way is to take them up, like other bulbs.

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## No. 2.—BORDER FLOWERS.

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### FIBROUS-ROOTED PERENNIALS AND BIENNIALS.

#### ERANTHIS. ACONITE.

*Hyemalis.*

#### HELLEBORUS. HELLEBORE.

*Lividus, niger, viridis.*

#### TUSILLAGO. COLTS-FOOT.

*Alba, fragrans, Adonis, vernalis.*

#### ALYSSUM. MADWORT.

*Calycinum, alpestre, montanum, &c.*

#### ARABIS. WALL-CRESS.

*Alpine, grandiflora, nutans.*

#### DRABA. WHITLOW-GRASS.

*Aizoides, Androsace, hirta.*

#### FUMARIA. FUMITARY.

*Spectabilis.*

#### OROBUS. BITTER VETCH.

*Vernus, albus, pyrenaicus.*

#### POTENTILLA. CINQUEFOIL.

*Napalenses, Russelliana.*

## SAXIFRAGA. SAXIFRAGE.

*Cordifolia*, *crassifolia*, *oppositifolia*, *umbrosa*, &c.

## VALERIANA. VALERIAN.

*Tripteris*, *Phu*, *calcitrapa*.

## VIOLA. VIOLET.

*Calcarata*, *odorata*, and thirty-eight other species.

This sweet little flower is an universal favourite. The *odorata* and its varieties are most valued ; but they cannot be had in perfection unless a good deal of pains is bestowed on them. Slugs are very destructive to the violet, devouring the flowers as much before as after they are in bloom. Where the flowers are in much request, beds are made on purpose for them, composed of a layer of coal-ashes on the bottom, covered with a compost of peat-earth, loam, rotted cow-dung, and sand ten inches thick. On this young runners are planted, six inches apart, in July, carefully attended ; and, when the cold of autumn sets in, they are covered with a frame and lights, and defended from the frost throughout the winter. Violets should be potted in August for forcing, which is most successfully done in a mild hot-bed. The double Neapolitan is the best for forcing.

## DODECATHEON. AMERICAN COWSLIP.

*Meadia*.

## GENTIANA. GENTIAN.

*Acaulis*, *lutea*, *purpurea*, *cruciata*, and twenty others.

## IBERIS. CANDYTUFT.

*Saxatilis*, *sempervirens*, *ciliata*, *rotundifolius*.

## PHLOX. LYCHNIDEA.

*Divaricata*, *setacea*, *subulata*.

## POLEMONIUM. GREEK VALERIAN.

*Reptans*, *sibericum*, *cæruleum*.

## SOLDANELLA. SOLDANELLA.

Alpine, best kept in pots.

## ACONITUM. MONKSHOOD.

Napellas, and sixteen others.

## ANTIRRHINUM. SNAP-DRAGON.

Alpinum, majus, and varieties.

## AQUILEGIA. COLUMBINE.

Alpina, hybrida, &c.

## ASCLEPIAS. SWALLOW-WORT.

Vincetoxicum.

## CAMPANULA. BELL-FLOWER.

Glomerata, Carpatica, persicifolia, pyramidalis, and fifty-six others. The pyramidal may be kept in pots, and trained to be highly ornamental.

## CHEIRANTHUS. WALL-FLOWER.

Fruticulosus with varieties, alpinus, &c.

## COREOPSIS. DWARF SUN-FLOWER.

Verticillata, &c.

## MATHIOLA. STOCK.

Incana, annua, Græca.

To our old favourites, the ten-week and Brompton stocks, have been added many new varieties of Russian, which add to the variety rather than to the beauty of the tribe.

## DICTAMNUS. FRAXINELLA.

Albus, with several varieties.

## ERODIUM. HERON'S-BILL.

Hymonides, &c.

## GERANIUM. CRANE'S-BILL.

Sanguineum, &c.

GEUM. AVENS.

Napalensis.

GNAPHALIUM. EVERLASTING.

Olympicum.

HESPERIS. ROCKET.

Matronalis, double, white, and purple.

LUPINUS. LUPINE.

Pollyphilla, &c.

LYCHNIS. LYCHNIS.

Dioica, viscaria, chalcedonica, &c.

ŒNOTHERA. EVENING PRIMROSE.

Many beautiful species.

PŒONIA. PEONY.

Albiflora, &c. many species.

PINGUICULA. BUTTERWORT.

Alpina, grandiflora.

THALICTRUM. MEADOW-RUE.

Aquilegifolium, alpinum.

TROLLIUS. GLOBE-FLOWER.

Americanum, Europæus.

VERBASCUM. MULLIEN.

Cupreum, &c.

APOCYNUM. DOG'S-BANE.

Hypericifolium.

ASTER. STARWORT.

Alpinus, and many other species.

CHELONE. CHELONE.

Barbata, glabra, obliqua.

## CINERARIA. CINERARIA.

Alpina, canadensis, &c.

## DELPHINIUM. LARKSPUR.

Grandiflorum, &c.

## DIANTHUS. PINK.

Barbatus, chinensis, fimbriatus, plumarius, &c.

## EPILOBIUM. WILLOW-HERB.

Alpinum, &c.

## ALTHEA. HOLLYHOCK.

Rosea.

## CHRYSANTHEMUM. GOLD-FLOWER.

Coronarium, &c.

## HYPERICUM. St.-JOHN'S-WORT.

Ascyron, pyramidatum, &c.

## LOBELIA. LOBELIA.

Assurgens, fulgens, splendens, cardinalis, siphilitica, &c.

## MONARDA. MONARDA.

Didyma, fistulosa, rugosa.

## OXALIS. WOOD-SORREL.

Violacea, &c.

## PHLOMIS. PHLOMIS.

Gigantea, &c.

## RUDBECKIA. RUDBECKIA.

Hirta, purpurea.

## SARRACENA. SIDE-SADDLE FLOWER.

Flava, purpurea.

## SCUTELLARIA. SCULL-CAP.

Albida, &amp;c.

## HELIANTHUS. SUN-FLOWER.

Atrorubens, &amp;c.

## RHEXIA. RHEXIA.

Mariana, virginica.

## SPIGELIA. WORM-GRASS.

Marylandica.

## CHRYSANTHEMUM. GOLD-FLOWER.

Indicum.

This is only a half-hardy border plant, requires to be kept in pots, and nursed in a frame or house to get it to flower before frost sets in. They are propagated by slips taken off in March, by cuttings in May, or by layers in August. The first make tall and strong plants, but the last make the most handsome and bushy. Large flowers are obtained by thinning the flower-buds, i. e. all the secondary buds are pruned off. Such as flower in a cluster should be thinned more sparingly; the Superb Cluster Yellow, for instance, should be allowed to shew its character. *Gar. Mag.*

The following annuals and perennials are among the newest and most valued flowers for borders, &c. viz.

Clarkia pulchella	Chelone rosea
Schizanthus porrigens	Phlox odorata
Gillia capitata	—— carolina
Œnothera tenella	Viola nepaulensis
—— triloba	Pironia lutea
—— speciosa	Trillium grandiflorum
—— Lindleyana	Scilla peruviana alba
Polemonium siberica	—— cærulea
Lupinus pollyphilla	Lillium Longiflorum

<i>Calceolaria corymbosa</i>	<i>Phyteuma orbiculata</i>
<i>Collinsia grandiflora</i>	<i>Tigridia oxypetala</i>
<i>Mimulus lutea rivalis</i>	<i>Lopezia coronata</i>
<i>Petunia nyctaginifolia</i>	<i>Erythrina crista galli</i> *
<i>Polentilla Russelliana</i>	

\* This plant, formerly treated as a stove exotic, is now found to stand our winter, by covering the roots. The stems are killed, but new ones rise in the spring, and flower in autumn.

### No. 3.—CATALOGUE

OF THE

### MOST ESTEEMED SORTS OF BULBS, &c.

NOW IN THE TRADE.

#### TULIPS.

##### FINE INCOMPARABLE VERPORTS.

Amazon	Juweel
Artificielle	La Fidelle
Bienfaisante	La Plus Belle
Blondeau	Nouveau
Briseis	O !
Bruno	Phillida
Daphne	Pomona
Favourite	Premier Noble
Florida	Superbe
Graaf van Buuren	Tendresse
Hebe	Trianon
Helena	Voorhelm
Jolanda	

##### FINE CHERRY AND ROSE.

Amadis	Brulante Eclatante
Andromache	Cassandra
Antoinette	Catalani
Arbre de Diane	Catherine
Bacchus	Cerise à Belle Forme

Cerise extra  
 — de Maroc  
 — primo Faquette  
 Claudiana  
 Compte de Virgennes  
 Comtesse de Maroc  
 — Marsan  
 Dodona  
 Domingo  
 Duchesse de Clarence  
 Fleur de Dames  
 Grand Rose Imperial  
 Hebé Superfine  
 Iphigenia  
 Julia  
 Juno

L'Admirable  
 Lady Exeter  
 Lelat en Cerise  
 Lord Colchester  
 — Hill  
 L'Ornement de Parc  
 Madame Gyzelaar  
 Manon  
 Maria Louisa  
 — Theresa  
 Matilda  
 Monsieur Pit  
 Perlé Brillante  
 Rose Mignonne  
 — Monti  
 Walworth

## FINE BIBLOMENS.

Abdalonimus  
 Adelaide  
 Albicore  
 Ambassadeur d'Hollande  
 Belle Actrice  
 Black Baguet  
 Blanche Violet  
 Caffée Brulé  
 Caroline  
 Château de Bruxelles  
 Comtesse de Gand  
 Constantia  
 Czarine  
 Desdemona  
 Desiderata  
 Duchesse de Parme  
 — Tuscany  
 — Wellington  
 Elizabeth  
 Eminent  
 Favorite de Viscour  
 Gadsby's Magnificent  
 Grotius  
 Holmes's Ring  
 Hugobert  
 Inapproachable  
 La Belle Perfection  
 — Princesse

Laomedon  
 Laura  
 Livia  
 Lord Hawke  
 Maître Partout  
 Moreau  
 Mountain of Snow  
 Prince Regent  
 Queen Charlotte  
 Reine d'Egypte  
 Respectable  
 Roscius  
 Rubens  
 Scipio  
 Sophia  
 Titania  
 Titian  
 Translucent Noir  
 Transparent Noir  
 Triomphe de Monde  
 Violet Alexander  
 — Blondeau  
 — Indiana  
 — Lysander  
 — Ma Favorite  
 — Remarkable  
 Virginia  
 Wade's Ring

## FINE BIZARDS.

Abaddon	Estimé
Abercrombie	Franklin's Washington
Archduc Charles	Gaucola Rectified
Baar's Wellington	Globe
Belle Financia	Gloria Mundi
Bernadotte	Grand Berger
Bizard Eclatante	Heroine
Britannicus Nova	King of Prussia
Captain White	Languedoc
Cardinal	Leopoldina
Catafalque	Masonia
Cato	Milo Superbe
Charbonnier Noir	Mirabeau
Commandant	Ophir
Conquestadore	Othello
Debonnaire	Pizarro
Demetrius	Polyphemus
Duke of Clarence	Pont d'Arcole
Emperor of Austria	Prince Leopold
———— Russia	Rembrandt (very fine)

## EARLY TULIPS FOR FORCING.

Agatha Royal	Globe de Rigo
———— Violet	Golden Sceptre
Aurora	Grand Blanche
Beauté parfaite	Imperator
Belle Dorothea	Isabelle
Claremont	Monument
Duc Van Thol	Sweet-scented Florentine

## DOUBLE TULIPS.

Amiable Violette	Couronne Imperial
Belle Blanche	———— Pourpre
Caffée Brun	Œdipus
Couleur de Feu	

## PARROT TULIPS.

Gloriosa	Perfecta
Monstreuse	

## No. 4.—HYACINTHS.

## DOUBLE REDS, VARIOUS SHADES.

Augustus Rex	Locke
Boerhaave	Louis Seize
Bruidskleed	Madame Zoutman
Catherine Victorieuse	Maria Louisa
Delices des Flores	Regina Ruberorum
—— de Printems	Rex Ruberorum
Diadème de Flore	Rouge Blouatre
Flos Sanguineus	—— Joli
Glorious Superbe	—— pourpre et noir
Goudheurs	Roxana
Groot Vorste	Tamerlane
Henri Quatre	Velours rouge
Josephine	Waterloo

## DOUBLE WHITES.

Admiral Zoutman	Graaf Bentinck
Alamode	Grand Blanche Imperial
Anna Maria	—— Monarque
Cœur Amiable	Jeanette
—— Noir	Minerva
Comtesse d'Holland	Og Roi de Basan
Dea Florum	Prins van Waterloo
Don Gratuit	Reine de Prusse
Duc de Berri	Staatin General
—— Valois	Sultan Achmet
Elise	Supreme Alba
General Washington	Venus
Gloria Florum	Vicomtesse de Rhoaoult
——— Suprema	Virgo

## DOUBLE BLUES.

Alamode	Duc D'Angoulême
Bouquet constant	Endragt
Bucentaurus	Envoyé
Buonaparte	Globe Terestre
Commandant	Gloria Mundi
Compte de St. Priest	Helicon
Directeur von Flore	Jupiter

Incomparable Azure	Monsieur
Kroon van Indian	Nigritienne
L'Amitié	Noir Veritable
L'Importante	Pasquin
Lord Wellington	Passe non plus ultra
Mignon de Dryflauht	—— Tout
Mon Bijou	Sertorius

## DOUBLE YELLOWS.

Bouquet d'Orange	La Pure d'Or
Grand Alexander	Louis d'Or
Jaune Neapolitane	Ophir

## SINGLE REDS.

Amiable Rosette	L'Eclatante parfait
Cornelia	Lord Wellington
Grootmiester	Paix d'Amiens
La Victorieuse	Piramide Royale
L'Eclair	Richesse de Fleurs

## SINGLE WHITES.

Emilius	Premier Noble
Grand Vainquer	Prince de Galetzin
Hercules	Staaten General
La Candeur	Thais

## SINGLE BLUES.

Achilles	General Hoche
Appius	Konig's Mantle
Crepuscule	La Grand Vidette
Emicans	La plus Noir

## SINGLE YELLOWS.

Adonis	La Majesteuse
Cæsus	La Pluie d'Or
Jupiter	Prins van Orange

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## No. 5.—POLYANTHUS NARCISSUS.

Bazelman Major	L'Etoile d'Or
Belle Liegeoise	Luna
Bouquet Royale	Primo Citroniere
Czar de Muscovie	Soliel d'Or
Grand Monarque	Zeelander

## No. 6.—ANEMONES.

## BLUE AND WHITE-STRIPED.

Belle Afrique	La Princesse
—— Amasia	Marmontelle
—— Amerique	Passe Gravita
—— Glodine	—— Salamander
Cambray	Pavillon
Celestina	Primaat
Compte d'Albemarle	Princesse de Conti
Cotonne	Pronk Juweel
Emperor	Pure Blanche
Evêque de Cologne	Purpure Piret
Gloria	Reine de France
—— Mundi	Ruban, blue
Grisdaline Superbe	Sandre
Grisetta	Sertorius
Incomparable Azure	Syrinx
Indigo	Triomphe Columbine
Jasper Grisdaline	Walworth
Le Januaire	

## RED AND WHITE-STRIPED.

Agathe Incomparable	Castor
—— Sanspareil	Cedo nulli
Archelaus	Comble de Gloire
Argentina	Emailee
Bardonia	La Pucelle
Bartholeraine	Manteau Corail
Bellisarius	Marmara
Bizard Oriflamme	Portlandia
Blanche Havite	Quatricolor
—— Jaunâtre	Reine d'Anemones
Caracalla	Triomphant

## No. 7.—RANUNCULUSES.

WHITE, AND WHITE-SPOTTED, OR EDGED.

Agreeable	Fulvius
Andrew	Garricola
Argus	Juliet
Benjamin	Louissette
Deborah	Pourpre Pannachée
Doctor Franklin	Princess Charlotte
Eliza (spotted)	——— of Wirtemberg
Elizabeth	Pucella
Endon	Suprema
Estimé	Tendresse
Faustina	Venus
Florence	

RED AND WHITE-STRIPED OR EDGED.

Cremona	Œillet duc
Curion	Pierre le Grand
Flagellie à quatre couleurs	Princess Charlotte Augusta
Grand Prior	Rhododendron
La Temeraire	Rose Flamme
Madelice	True Merit
Nouvelle	

RED AND YELLOW-STRIPED.

Celadon	Marbre de Paris
Coquelicot	Œillet parfaite
Earl of Errol	——— Superbe
Favorite Superbe	Quel bonheur
L'heureux hazard	Togo Pieta

DARK AND DARK-PURPLE.

Achilles	Diadème pourpre
Adolphus	Duke of Kent
Bon Financier	Evêque d'Iprès
Charbonnier	Fleur de Cannelle
Condorset	Manteau Noir
Coronnax	Maximilian

## LIGHT, PURPLE, AND GREY.

Beauté frappante	Electrice
Bleuâtre	Germanicus
California	Habite Veloute
Duke of Sussex	Nomius
Earl of Bath	Portia
Egrillarde	Roi de Perou

## CRIMSON.

Arlequin de Vienne	Lentidrides
Domitrean	Persicaria
Earl of Hardwicke	Trajan
Gunn's Crimson	William Pitt
Henriette	Xanthus
Hyperion	Zebulon

## RED.

Adonis	Joinville
Alphonso	Molleure
Bourgogne	Pizarro
Cæda nulli	Quivedo, on yellow
Heliotrope	Tyrconnel

## ROSY, AND ROSE ON WHITE.

Alpina	Duchess of Wellington
Capricieux	Juno
Coleur de Perle	Rose de Dames
Colossus	Stella
Cora	Tillet's Blush

## YELLOW, AND YELLOW-STRIPED, OR EDGED.

Admiral des Fleurs	Lystra
Adrian	Ophir
Beauté Behemoth	Pretiosa
——— Jaune	Prince Galitzen
Beroth	——— William V.
Cecil	Sappho
David	Viscount Parker
Lennox	Tierney

## ORANGE.

Amalaric	Emelius
Amalthea	Feu Triomphant
Bavaroise	Orange Barbançon
Camella	Sesostris

## OLIVE.

Admiral Howe	Favourite
Azorienne	Lord Stavendale
Carlos	Olive Pannachée
Desdemona	Rubicon

## No. 8.—AURICULAS.

Akerley's Alpine Shepherdless	Hey's Lovely Ann
Asworth's Man-of-War	Hoffley's Lord Nelson
Barlow's Britannia	Hornsey Hero
———— King	Hughes's Pillar of Beauty
———— Morning Star	Kenyon's Ringleader
Bearless's Superb	———— Surprise
Buckley's Jolly Tar	Lady Blucher
———— Lady Wellington	Laurie's Glory
———— Lord Hood	Lea's Venus
Chilcot's Brilliant	Leigh's Colonel Taylor
Clegg's Black and Green	Moore's Jubilee
Clough's Defiance	———— Glory
Cockup's Eclipse	Oddy's Queen Caroline
Compton's Admiral Gardiner	Pearson's Badajoz
Cox's British Hero	Pollet's Highland Boy
Dean's Regulator	Pott's Beauty of England
Dyson's Queen	Rider's Prince Waterloo
Galloway's Glory of Oldham	Salter's Garland
Gorton's Champion	Schole's Mrs. Clarke
Grime's Privateer	Warre's Prince Blucher
Healey's Prince of Wales	Wood's Lord Lascelles

## CRIMSON, PURPLE, AND YELLOW SELFS.

Bury's Lord Primate	Redman's Metropolitan
Flora's Flag	Wild's General Lud
Nicholson's Venus	———— Star

## No. 9.—POLYANTHUSES.

Allen's Favourite	Smith's Lady Nelson
Billington's Beauty	Stretch's King
Brooke's Duke of York	Tate's Prince Regent
Brown's King	Thomas's Nelson
Darlington's Defiance	Thompson's Lord Nelson
Eckerley's Black and Gold	Thorpe's Golden Fleece
Hardman's ditto, ditto	Turner's Prince of Wales
————- Ranting Widow	————- Princess of Wales
Park's Lord Nelson	Yorkshire Prince Regent
Pearson's Alexander	

## DOUBLE POLYANTHUSES.

Double Crimson, and lilac, white, yellow and velvet  
Primroses.

## CYCLAMEN.

Autumnale Album	Persicum
Coun	Sweet-scented Autumnale
Hederifolium	

## COLCHICUMS.

Agatha Variegatum	Purpurium plenum
Agrippinum	————— Variegatum
Album	Variegatum plenum

## CROWN IMPERIALS.

Kroon op Kroon	Rubro
Luteo Pleno	—— Folio Variegato
—— simplicis	—— Pleno
Maximus	Slaagswaard
Orange Sulphureo	William Rix

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## No. 10.—CARNATIONS.

## SCARLET BIZARDS, viz.

Arche's Sir Isaac Newton	Rawling's Salamander
Ashton's Lord Castlereagh	Sharp's Defiance
Banfield's Lord Nelson	Smith's Solomon
Costin's British Monarch	Snook's Wellington
Clegg's Colonel Bayley	Tomlinson's Augusta
Davey's Royal Sovereign	Walker's Calypso
Falkner's Sir W. Wallace	———— Duke of York
Fellow's Burdett	———— Hero
Gordon's Burdett	———— Marquis
Groom's Mars	———— Monarch
Handy's Regent	———— Patriot
Harley's Waterloo	Waterhouse's Magnificent
Jupiter	———— Rising Sun
Manning's Glory	———— Syntax
Nottcutt's Nelson	Weltjie's Goliah
———— St. Vincent	———— Sir E. Pellew
Pyke's Champion	Wild's Perfection
Rainbow	

## PINK AND PURPLE BIZARDS.

Buck's Lord Bagot	Walker's Buckingham
Davey's Duchess of Devon-	———— Pilgrim
shire	Ward's Elizabeth
Hathersley's Freedom	Waterhouse's Summit of
Hine's Duchess of York	Perfection
Lacey's Wellington	Weltjie's King George
Lady Grey	———— Nonsuch
Pyke's Eminent	Wood's Lord Collingwood
Smith's Fair Helen	

## SCARLET FLAKES.

Asten's Hero	Holden's Britannia
Barnes's Nelson	Hufton's Hobhouse
Chaplin's Abercrombie	Lacey's Queen
Clegg's George IV.	———— Salamanca
Ely's Ranger	Lee's No. 159
Hall's Duchess of Kent	Neacham's Invincible
Harley's Matilda	Plummer's Waterloo

## PURPLE FLAKES.

Bate's Wellington	Meacham's Maria
Bruin's Marina	Oddy's Henry Hunt
Cornfield's Mrs. Robinson	Palmer's Defiance
Dixon's Jane	Phillip's Defiance
Fulbrook's Grenadier	Wood's Ambassador
Kenney's Excellent	

## PINK AND ROSE FLAKES.

Dixon's Fame	Pearson's Moira
Fletcher's Devonshire	Plummer's Lady Hamilton
Hardman's Wellington	Pyke's Lady Hamilton
Harley's Mrs. Clarke	Rivier's Incomparable
Hoyle's Beauty	Rochdale Beauty
Lordon's Miss Blont	Tate's Jubilee
Maddock's Maria	Tree Carnation, white
Hogg's Galatea	—— Clove
—— Paddington	Walker's Fairy Queen
—— Queen	Wood's Invincible

## No. 11.—PINKS.

Banbury's Lace	Davey's Defiance
Berkeley Hero	—— Duchess of Devonshire
Blencowe's No. 4	—— Eclipse
Bray's Goliath	—— Hero
—— Invincible	—— Miss Havard
Bury's Mrs. Clarke	—— — Peele
Church's King	—— Nelson
Clee's Lady Nelson	—— Nonpareil
—— Lord Nelson	—— Sir T. Stanley
Clover's Invincible	—— Venus
Collier's King	—— Victorious
—— Wonderful	Eagleton's Sovereign
Coltson's Britannia	Field's Fair Phillis
Dakin's Burdett	Ford's Seedling
—— Colonel Lennox	Golding's Seedling
Davey's Britannia	Greaves's Gloriosa

Green's Princess of Wales	Jeffery's Beauty
Groom's Duke of York	Keen's Wellington
———— George IV.	Maddock's Sir Sidney Smith
———— Lord Shannon	Maffey's Royal Ann
———— Trafalgar	———— George
———— Waterloo	———— Golden
———— Wellington	Maynard's Roseleaf
Harcott's Seedling	Neighbour's Countryman
Harefield Beauty	Newman's Burdett
Harris's King	Novey's Supreme
Harrison's Rising Sun	Rook's Jupiter
Hine's Queen	Scott's Dark Lace
Hopkins's Superb	Windsor Confidant
Humber's Regulator	

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## No. 12.—ROSES.

### CHIEFLY NEW SORTS.

Amaranth	Grand Blanche Belgique
Aurora	———— Present
Bishop	———— Purple
Black Frizzled	Great Maiden Blush
Blandford	Imperial Blush
Blush Dwarf Cluster	Infernal
———— Early	Leyden
———— Hundred-leaved	Lisbon
———— Imperial	Negro
Brown's Blush	Nonpareil
Brunette	Royal Crimson
Burgundy	Sanspareil
Cardinal	Spongs
Carmine	Tuscany
Celestial	Pearson's Gigantic
Chancellor	Pencilled Mignonne
Dutch Carmine	Plicate
———— Crimson	Pompadour
———— Hundred-leaved	Proserpine
Early Blue	Provence New
Favourite Mignone	———— Dutch
———— Purple	———— Dwarf

Provence Moss  
 ——— Scarlet  
 ——— White Moss  
 Pinto  
 Red Monthly  
 Rosa Mundi

Rose de Meux  
 ——— de Quatre Saisons  
 ——— Unique  
 White Provence  
 York and Lancaster

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**J.E.H.**

